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THE NEW YORK BOTANICAL GARDEN

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CROCUS CHRYSANTHUS VARIETIES :

- | | |
|-----------------------|---------------------|
| 1. White Egret. | 2. Snow Bunting. |
| 3. John Hoog. | |
| 4. Zwanenburg Bronze. | 5. Golden Pheasant. |

A HANDBOOK OF CROCUS AND COLCHICUM FOR GARDENERS

By E. A. BOWLES, M.A., V.M.H., F.L.S.

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CONTENTS.

	PAGE
GLOSSARY OF THE BOTANICAL TERMS USED FOR CROCUS AND	
COLCHICUM	ix
I. THE CROCUS IN THE GARDEN	I
II. BOTANICAL CHARACTERS	12
III. THE SPANISH GROUP	27
IV. EASTERN LEAFLESS AUTUMNAL SPECIES	33
V. AUTUMNAL SPECIES FLOWERING WITH LEAVES	48
VI. THE SAFFRON CROCUS	59
VII. THE VERNUS GROUP	71
VIII. THE IMPERATI GROUP	80
IX. THE EASTERN RETICULATE SPECIES	93
X. THE AUREUS GROUP	102
XI. ANNULATE CROCUSES	118
XII. MISCELLANEOUS SPRING FLOWERING CROCUS	
SPECIES	138
XIII. NOTES ON A BIBLIOGRAPHY OF THE CROCUS	147
XIV. COLCHICUMS	152
XV. COLCHICUM AUTUMNALE AND ITS ALLIES	161
XVI. COLCHICUM SPECIOSUM AND ITS VARIETIES	167
XVII. TESSELLATED SPECIES	171
XVIII. SPECIES PRODUCING LEAVES WITH THE FLOWERS	176
XIX. BULBOCODIUM VERNUM AND MERENDERA BULBO-	
CODIUM	180
INDEX	183

LIST OF ILLUSTRATIONS.

I.	CROCUS CHRYSANTHUS VARIETIES . . .	<i>Frontispiece</i>
	White Egret. Snow Bunting. John Hoog. Zwanenburg Bronze. Golden Pheasant.	
2.	The Parts of Crocus and Colchicum Flowers .	<i>To face p.</i> 18
3.	CROCUS KARDUCHORUM " "	40
4.	CROCUS LONGIFLORUS " "	50
	Four-fifths natural size.	
5.	CROCUS SATIVUS " "	64
6.	I.—CROCUS TOMASINIANUS " "	74
	2.—CROCUS TOMASINIANUS	
	Var. pictus.	
7.	CROCUS SPECIES NOVA " "	78
	Distributed as C. Heuffelianus. Two-thirds natural size.	
8.	CROCUS IMPERATI " "	82
	Feathered and Plain Forms.	
9.	I.—CROCUS CORSICUS. . . . " "	88
	2.—CROCUS SUAVEOLEUS.	
	3.—CROCUS MINIMUS.	
	4.—CROCUS ETRUSCUS	
10.	CROCUS DALMATICUS " "	90
11.	CROCUS SIEBERI " "	94
	1. Var. Hubert Edelsten. 2. Typical Form. 3. Var. from Mount Kydnos. 4. Var. Versi- color.	
12.	CROCUS VELUCHENSIS " "	96
	Three-quarters natural size.	

13.	CROCUS AUREUS	<i>To face p.</i>	104
	Three-quarters natural size.		
14.	CROCUS KOROLKOWII	„ „	108
15.	CROCUS CANDIDUS	„ „	114
	Var. subflavus. Three-quarters natural size.		
16.	CROCUS CHRYSANTHUS	„ „	126
	Var. E. A. Bowles. Slightly enlarged.		
17.	CROCUS CHRYSANTHUS BULLFINCH	„ „	130
18.	CROCUS AËRIUS MAJOR	„ „	132
	Three-quarters natural size.		
19.	CROCUS HARTMANNIANUS	„ „	134
	Three-quarters natural size.		
20.	CROCUS FLEISCHERI	„ „	140
	Three-quarters natural size.		
21.	CROCUS LEICHTLINII	„ „	144
	Three-quarters natural size.		
22.	COLCHICUM ALPINUM	„ „	164
23.	COLCHICUM SIBTHORPII	„ „	172
24.	COLCHICUM MONTANUM	„ „	176
	Three-quarters natural size.		

A GLOSSARY OF THE BOTANICAL TERMS AS
USED FOR CROCUS AND COLCHICUM.

<i>Annuli</i>	Rings of membrane forming the lower portion of the corm tunic in certain species.
<i>Anther</i>	The upper portion of a stamen which contains the pollen.
<i>Basal spathe</i>	A tubular membrane springing from the summit of the corm and wrapping the flower stalk and ovary in certain species.
<i>Basal tunic</i>	A separate small portion of tunic at the base of a corm.
<i>Blade</i>	The outer and thinner edges of a leaf, rolled inwards when young, expanded at maturity.
<i>Cap</i>	An upward prolongation of the fibres or membrane of a corm tunic.
<i>Capsule</i>	The seed vessel.
<i>Caruncle</i>	A fleshy protuberance on the seed.
<i>Channel</i>	A longitudinal groove in the leaf.
<i>Ciliated</i>	Fringed with fine hairs.

x GLOSSARY OF BOTANICAL TERMS

<i>Corm</i>	A solid bulb-like underground stem.
<i>Corm tunic</i>	The fibrous or membranous wrapping of the corm.
<i>Diphyllous</i>	Two - leaved, used of the <i>proper spathes</i> , see under Spathe.
<i>Filament</i>	The stalk of an anther.
<i>Glabrous</i>	Smooth, without hairs.
<i>Keel</i>	A thickened central ridge on the under side of the leaf.
<i>Membranous</i>	A skin of homogeneous tissue forming the tunic of some species.
<i>Monophyllous</i>	One - leaved, used of the <i>proper spathe</i> , see under Spathe.
<i>Ovary</i>	The immature seed vessel.
<i>Perianth</i>	The coloured floral envelopes, representing the sepals and petals.
<i>Perianth tube</i>	The slender tubular portion of the flower between the ovary and the segments, serving instead of a stalk.
<i>Pistil</i>	The female organ consisting of style, stigma and ovary.
<i>Proper spathe</i>	See under Spathe.

<i>Protogynous</i>	When the stigmata are receptive before the anthers have ripe pollen.
<i>Reticulate</i>	With netted fibres. Used of the corm tunic.
<i>Scape</i>	The flower stalk below the ovary.
<i>Segments</i>	The divisions of the perianth, six in number, arranged in an outer and inner series.
<i>Sheathing leaves</i> } ,, <i>scales</i> }	A strong wrapping of three to five tough and fleshy tubular leaves arising from the inner wrapping of the corm, and enclosing the leaves and flowers until they reach the ground level.
<i>Spathe</i>	Thin semi-transparent bracts that enclose the flower when young.
,, <i>basal spathe</i>	A spathe springing from the summit of the corm.
,, <i>proper spathe</i>	One or two spathes springing from just below the ovary. When one only is present it is termed monophyllous, and if there are two, the plant is said to be diphyllous.
<i>Stamen</i>	The male organ consisting of anther and filament.
<i>Stigma</i>	The upper part of the pistil which receives the pollen.

xii GLOSSARY OF BOTANICAL TERMS

<i>Stigmata</i>	}	The three divisions into which the pistil of a Crocus is divided.
<i>Stigmatic</i>		
<i>branches</i>		

Throat The funnel shaped orifice of the flower where the perianth tube and perianth segments join.

Tube See Perianth tube.

Tunic See Corm tunic.

THE CROCUS.

I.

THE CROCUS IN THE GARDEN.

THE GENUS CROCUS deserves more attention than it has hitherto received in British gardens.

Three only of its spring-flowering species have become general favourites, and there are still many good gardens in which autumnal and winter-flowering species have never been planted. Yet no other genus of hardy plants contains so many species and varieties that will flower in the open ground during the dullest months of the year.

By planting those now offered by nurserymen an unbroken succession of flowers may be obtained from mid-September until April showers bring such a wealth of blossom that the gardener no longer needs the lowly Crocus. More peaceful conditions and security for travel in southern Russia and Asia Minor might assist in the re-introduction of several beautiful species, that the greater skill of the modern gardener, with his moraine beds and properly drained rock gardens, should add to the number of early autumnal treasures.

The beautiful orange-yellow *C. Scharojanii* and the creamy-white *C. vallicola* from the Caucasus, and

some of the Eastern forms of the variable *C. cancellatus*, if successfully established in our gardens, would lengthen the Crocus season by their regular appearance early in August.

The first rains of September ought to bring up sheets of the almost blue flowers of *C. speciosus* in borders and shrubberies, as surely and as suddenly as they do the mushrooms. Any November or December morning, on which the sun shines and the ground is free from snow should provide clumps of the lilac or white blossoms of *C. laevigatus* in every British garden that contains a wall, shrub or stone that can cut off the north or east wind from this fragrant species. New Year's Day will generally invite the making of a list of plants in flower if the CC. *Chrysanthus*, *Sieberi*, *Imperati* and *Korolkowii* have been planted.

It is then a pity that in so many gardens the Crocus season only begins in the latter weeks of February with the Dutch Yellow, and ends a fortnight or so later with the garden raised forms of *C. vernus*.

A large majority of species are hardy enough to thrive in the open, and are quite as easy to grow well as most flowers that are worth having. Any ground sufficiently well tilled to grow a decent lettuce or onion should grow Crocuses to perfection. The best possible corner of a garden for growing a collection of Crocuses would be, to my mind, a portion of an old kitchen garden open to the south and with a wall or buildings on the north side.

Some, as for instance CC. *speciosus*, *pulchellus* and *nudiflorus* in autumn, *Tomasinianus*, *aureus*, *candidus*,

vernus and others flowering in spring can hold their own in mixed borders or shrubberies, but where choice and rare kinds are to be grown it is safest to give up a long, narrow bed to their use. There the leaves can mature naturally, instead of being overshadowed and choked by the growth of other plants. This too frequently happens where they are planted in rock gardens or herbaceous borders, and their owner ungratefully forgets the pleasure they gave earlier in the year, when enjoying the luxurious way herbaceous plants spread over the bare spaces in late April and May. I need hardly warn the Crocus grower against plaiting the green leaves, just at the time they are most active in building up the reserve of nutriment in the young corm, when the last thing one should wish is to hasten their decay and so shorten their period of usefulness.

The ideal soil would be one deeply tilled and rich in humus. It would not matter if it were somewhat heavy so long as it was well drained, for most Crocuses like to send their roots down into rich, strong soil, if the corms are lying in a light and warm one. This means that the upper eight or more inches should have coarse sand or sharp river grit mixed with it, and I have found it beneficial to both the plants and the grower if the corms are laid on an inch of silver sand at planting time, and covered over with another inch deep layer before the surface soil is replaced. It is a wonderful help at lifting time to find this well marked stratum of sand with the corms lying in it.

Something between four and six inches seems to be

the best depth for planting, but many species, especially *C. aureus* and *C. speciosus*, do not object to being much deeper.

However, as with deeply planted Tulips and Daffodils, though the plant remains vigorous very little if any increase is made. In collecting wild Crocuses I have invariably found them unpleasantly deep, and by the number of their old tunics it was clear that they had been at that depth for some twelve or more seasons, and had never formed more than the one corm each year. These, when grown in garden ground, multiplied rapidly by corm increase, so we may conclude that when it is desired to work up a stock of any variety it is best not to plant very deeply, and to lift the corms annually, cleaning away the old tunics and the withered portion of last year's corm from the base, if it will come away easily and without the use of force.

When a rich display of bloom is wished for the replanting can be put off till the third or even fourth year; but if it is noticed that the increase has been great enough to form congested tufts of leaves and the flowers are not as large as they should be, replanting should not be deferred beyond the following August. If planted in straight lines and liberally treated as to sand, it is an easy job to lift the dormant corms during a dry spell in the end of July or early in August, and a very pleasant one if the increase has been plentiful and the size of the new corms is satisfactory.

The autumn-flowering species should be replanted as soon as possible, as some,—especially *C. iridiflorus*

which prefers moist ground,—begin rooting in mid-July. Spring-flowering kinds can be stored safely in a dry, cool place until October if necessary, but are safer and sounder if planted in August.

If it is necessary to plant different kinds close to one another, as in the case of new seedlings of which there are but two or three roots, it is a good plan to alternate those with well marked differences of corm tunic, for instance, a coriaceous, or annulate form, next to one with a netted or parallel-fibred tunic. I have found this plan of great help in preventing their getting mixed at the next lifting. Slates may be buried between the plantings if it is desired to arrange the bed in square clumps instead of lines, but even with this aid to keeping clean stocks, it is better that neighbouring forms should be distinct in their tunics, as then a seedling from the next division is easily detected.

A cold frame given over to Crocuses is a very desirable form of luxury, and the winter-flowering and extreme Southern species can be grown thus to greater perfection—*CC. hyemalis*, *Tournefortii*, *Cambessedesii* and *cyprius* need protection and most of those that flower in November, December and January produce more perfect blossoms under cover than in the open during spells of bad weather. An ordinary brick-sided frame, with a slight slope to the south and the surface of the soil not more than a foot above the natural level is a delightful adjunct to the Crocus bed. The lights should be opened on all fine days, but closed at night and during very wet or cold weather from October to

April. As soon as the leaves have turned yellow towards the end of May, the lights should be placed on the frame and raised slightly at the back for ventilation, until the seeds have been collected and the time has come for lifting the roots, which in a frame should be done annually.

The soil in a frame needs more manuring than in an open bed. A little well decayed cow manure dug in and kept at a depth of four inches at least below the corms helps matters, and bone meal is the best artificial manure to mix with the upper soil.

For herbaceous beds and shrubberies the stronger growing kinds can be planted in large clumps and drifts. Soil should be removed to the depth of six inches and the corms laid on the bottom of the hole at the space of an inch from each other. It is customary to plant Crocuses as edgings to borders in rather formal lines or circles, but a charming effect is produced by planting some hundreds of one kind under deciduous shrubs, or at the back of borders between clumps of strong growing herbaceous plants that do not cover the ground with their leaves earlier than the middle of May, and thus allow time for the Crocus leaves to mature in an open space.

The Dutch Yellow, in my opinion, never looks better than when planted in a generously planned drift, towards the back of a large border, or round the stem of a leafless *Azalea mollis*, *Deutzia*, etc. All the florists' forms of *C. vernus* are suitable for this work, and *C. Tomasinianus* once planted should be allowed to spread naturally by seed as far as it will under

groups of roses or other summer-leaving shrubs. *C. speciosus* is the best of all the autumn flowering Crocuses for wide plantings, and does not object to an occasional digging over of the bed and the consequent deep burial of the corms. Only the stronger growers should be tried in grass and none succeed better than forms of *C. vernus* and the Dutch Yellow. I have always advised that they should be kept separate, or at any rate the yellow planted only among white varieties ; but a charming planting of irregular colonies, each of one kind, under some trees in a friend's garden taught me that if the yellow are planted in separate groups, instead of being scattered among the purples, they can be very effective.

The quality of grass differs so greatly that my rather poor success with the many species I have tried in a rough meadow need not discourage others with a finer brand of turf. I used to give bundles of rogues and mixed seedlings to Mr. Wilks to plant in his wild garden at Shirley, and in his grass they flourished and spread most delightfully. The soil there is a fine sand, and he used to say of it that it was so light that if he threw it up in the air it would never come down again, and naturally the grass on it is scanty and fine.

Where the turf is not coarse, and the ground well drained and open to sunshine, I advise planting CC. *Tomasinianus*, *aureus*, *chrysanthus*, *Sieberi* and *versicolor* as well as *C. vernus* for spring, and CC. *zonatus*, *speciosus*, *nudiflorus* and *longiflorus* for autumn.

The chief enemies of Crocuses are mice, and it is

necessary to be ever on the watch where large stocks are grown. A rabbit can do much mischief in a night or two in early spring, and pheasants, if once they discover the delight of eating Crocus corms will scratch up and devour great numbers. Small birds occasionally learn that after frosty weather the upper soil is loosened, and a pull at the young leaves will bring up a seedling of one or two years of age, and the owner finds the leaves, but not the tender, young corm. Sparrows for certain, and chaffinches I suspect, are the chief offenders. Black cotton stretched across the beds is the next best preventive to killing the birds.

In dry, frosty weather birds pull the blossoms to pieces for the sake of the drop of honey in the throat of the flower. Pans of water set about are good for both birds and flowers, but even with this attention black cotton may also be necessary.

Mice need fighting in all months and by any means. Break-back traps baited with Brazil nut are very useful weapons. Nor should one neglect the aid of cats, poison, virus, sunken jars or any other method of destroying the Bank Vole which nibbles off leaves and buds, and the Long Tailed Field Mouse which digs up and devours the corms.

In frames the larvæ of the Turnip Moth, *Agrotis segetum*, is in some seasons a great trouble as it bores into the newly formed corms during June and July, and one does not think of its evil ways until lifting time when much mischief has been done. The Yellow Underwing, *Triphaena pronuba*, and Angleshades moths, *Phlogophora meticulosa*, often lay eggs in the

frames and the larvæ attack the leaves and buds in autumn and early spring. They hide below ground in the daytime, so the best way of catching them is to visit the frame after dark with a good acetylene lamp, or if that is too strenuous a job, the evil things may be trapped by making a round hole with one's finger in the soil, close by the evidences of damage, and plugging the top of it with a lettuce leaf or juicy little Brussels Sprout. It is never long before the caterpillar finds the bait and avails itself of the provided bedchamber below it, and the enquiring finger detects a plump body at the bottom of the hole.

The most exciting part of growing Crocuses is the raising of seedlings, although it needs patience and a preliminary wait of three years before the first flowers are produced.

If you wish to cross varieties or species you should grow some in pots sunk in the ground that they may be brought into a house at flowering time ; but if you are not too proud or stiff to kneel down on the ground, much can be done in the open air beds or frame. It is necessary to open a bud and to remove the anthers before they have dehisced or shed their pollen. The segments can be turned outwards for this purpose by finger and thumb, finger outwards and pressing the convex surface of the outside of a segment till it becomes concave. The anthers having been removed with a pair of forceps, pollen from another flower may be rubbed on the stigma, and the segments turned back again to their normal condition. If brought into the house flowers will open quickly near a lamp or

fire, and a neighbour made some successful crossings in the open on dull days, and in the evening after his return from London, by placing a bell glass over a lamp till the air inside was heated and then placing it over the Crocus.

Of course these purposely planned crossings must be protected afterwards from the visits of bees by muslin covers. Of late years I have left it to the bees to arrange the eugenics of many Crocuses and they have done it so well that plentiful variation has resulted.

The seed capsules are below ground until just before ripening. From early in May onward to July a watch should be kept for their appearance above ground. Those species that flower in early autumn, such as *C. zonatus* and *C. speciosus*, ripen their seeds first. It is best to gather them before the capsule splits, as the seeds scatter soon after. They can be easily dried in old envelopes or small boxes. *C. caspius* and *C. Korolkowii* do not push their capsules above the soil, so they should be looked for when lifting the corms.

Seeds are best sown no later than the first week in September. We find it convenient to sow in small pots which are afterwards sunk in the soil and left undisturbed for two years.

Then they should be turned out and, if all is well, a good crop of cormlets about the size of a small pea, will be found at the bottom of each pot. These can be planted in rows in the open ground as one would treat adult corms, and left till they flower, which a

few may do in the following season, but most of them in the fourth year from sowing. The first three barren years soon pass away, and then it is good to stand before the seed bed on a sunny morning and see the rows of open blossoms with here and there one that is unlike its brethren and perhaps anything else one has seen before. A pure white seedling of *C. Sieberi* rewarded me for thirty years of patience, and I still hope for the same transformation in *CC. longiflorus*, *zonatus* and others.

II.

BOTANICAL CHARACTERS.

ANYONE who would spend half-an-hour in a careful examination and dissection of a living *Crocus* plant at flowering time, or just after, would be amply repaid for his trouble. It would be best to select three of the larger species, say a garden form of *C. vernus*; the Dutch Yellow, a form of *C. aureus*; and the Scotch *Crocus*, *C. biflorus*.

The Tunic. First notice the tunic or wrappings of the so-called "bulb," which is really a corm. A pocket lens will show that the tow-like strands enclosing the *C. vernus* are netted, that is the fibres branch and are joined together again. Most likely one or more of the upper and outermost wrappings will be completely skeletonized with clear spaces between the meshes of the fibre. The lower ones should show a membranous ground work in which the fibres are embedded, and that, at about two-thirds of the depth of the corm, the fibres become free, straight and parallel, curving inwards towards the base and allowing a clear passage between their strands for the roots. A dry specimen in autumn should show what is called the basal tunic, which in *C. vernus* is star shaped, composed of unbranched stiff fibres radiating from a circular, central shield. Its fibres enter among those

of the main tunic forming a complete wrapping and yet allowing the roots, which spring from a definite zone at the base, to escape between the strands.

In the Dutch Yellow the tunic is of a redder brown and its membrane is stouter and more persistent, so that unless a portion of a two years old tunic is still undecayed there will be no free fibres showing in the upper portion. It will be noticed that the tunic is prolonged upwards into withered, brown points, called the cap, a characteristic feature in some species, and wanting in others. This cap helps us to trace the origin of the corm tunics for it closely resembles the already browning tips of the scale leaves that encircle the main shoot of leaves and flowers. By slitting this tube of scale leaves longitudinally and peeling the scales downwards it will be seen that they become thick, juicy skins that cover the young corm, and finally dry and form the tunic. When all four, or more, sheathing scales have been peeled down it will be seen that the leaves are the next organs revealed, and that their white lower portions widen out and are fleshy like the bases of the sheathing scales, but that they only enclose a small section of the young corm, and are joined to it by their bases at about one-third of its depth. The tunic then is formed of the bases of sheathing scales and leaves, its fibres representing a continuation of those of the leafy bodies. Tunics vary so greatly in their fibrous skeleton and membranous base that they form a valuable aid for the recognition of species.

The tunic of *C. vernus* is termed a finely reticulated

tunic while in those of *C. Sieberi* and *C. susianus* the fibres are coarser and the interstices larger providing examples of coarse reticulation. In *C. Fleischeri* the fibres are silky and interwoven in a manner reminiscent of the tunic of *Iris reticulata* or *Iris Sisyrinchium*. In *C. aureus* and many others, the fibres are parallel throughout their length, but in many species slightly reticulated fibres occur in the upper third of the tunic and parallel fibres below.

Membranous tunics without fibres are found in *CC. hyemalis*, *caspius*, *Boryi* and others, but towards the base they split into strap-like divisions which when partially decayed closely resemble fibres.

Hard leathery tunics are found in *C. laevigatus* and some of the species related to the Scotch Crocus. Examination of the latter will show that the lower portion of the corm is enclosed by concentric rings of tunic, hard and horny like the main tunic, and armed on their upper edges with short teeth that assist them in clinging to each other and clothing the corm.

The Corm. Having removed the tunics we find two rounded, solid bodies, one on the top of the other. The lower will be rather wrinkled, brownish, and flattened at its poles ; the upper pearly-white, smaller, somewhat conical and attached at its base to the lower. The upper corm divided vertically and transversely will be found to be solid, and composed of cellular tissue and starch, somewhat similar to the kernel of a nut, and represents the stored material for the growing plant. It will enlarge at the expense of the older and lower corm, which is already becoming

flabby and wrinkled. In some species several new corms may be formed at the apex of the old, and in others from various points of its circumference. The corm represents a compressed, underground stem, an extreme modification of the stem-tuber, the new corms being branches formed annually on the old. It differs from a bulb in being a solid body instead of one formed of scales.

The stem is generally represented by no more than a flat, basal plate in a bulb, but forms the main portion of a corm. The investing scales of both represent leaves or leaf bases. In a bulb they are fleshy being stored with nutriment, while in a *Crocus* corm they are but dry skins forming the tunic. Thus the difference between a bulb and a corm is really only one of degree and gradations occur between the two.

Scale Leaves. Next in order come the scale leaves, or sheathing leaves of some writers. These we have seen envelop the young corm with their bases, but as they rise above it assume the form of a tube. They are three to five in number and the innermost is invariably the longest. For the most part they are composed of a stout colourless membrane, but the longest is in some species green at its tip, in others the tips widen out into papery blades.

These sheathing leaves appear both to protect and to strengthen the young shoot and assist it to pierce through the hardest soil in a quite wonderful way.

The Leaves. When this tube is slit down by the knife, the leaves, from one to a dozen or more according to the species, are the next organs within. Colourless

and strap shaped in their lowest portion they become wider, with inrolled edges, upwards. Mature leaves vary much in different species, but most of them have a well defined, raised central rib, or keel, on the back, corresponding with a white-surfaced groove on the upper side. The blades on either side, rolled at first, generally open out till they become almost flat at maturity. In some species there is a fringe of fine hairs on the edges of both keel and blades when the leaves are said to be ciliated; leaves without hairs are described as glabrous.

Those of *C. aureus* are ciliated, while in *C. vernus* they are glabrous. Two species, *C. carpetanus* and *C. nevadensis*, have peculiar leaves in which the blades are no more than slightly prominent ridges on the edges of the semicylindrical keel, while in *CC. Scharojanii*, *vallicola* and *zonatus*, the keel is as wide as the blade and a transverse section presents a somewhat cruciform appearance. In many autumn flowering species the leaves do not appear above ground until spring or shortly after the flowers, but this is only the case so far as I know with one spring flowering species—*C. gargaricus*.

Basal Spathe. Springing from the centre of the young corm we find the flower scape and notice a marked difference between that of *C. vernus* and *C. aureus*, for in the former a transparent, membranous spathe grows between it and the leaves, wrapping its lower two-thirds in a protecting tube. This is the basal spathe and is present in some species but is absent in others, as in the case of the Dutch Yellow.

Those species possessing the basal spathe for M. Herbert's Division I *Involucrati*, those without it his Division III *Nudiflori*. He was doubtful about its presence in two species, *C. banaticus* and *C. Tomasianus*, and placed them in a Division II *Subnudi*. The basal spathe, however, is generally present in both these species and the nearly allied one, described on page 78 as *C. Heuffelianus*, is the only one in which I have found some specimens lacking a basal spathe while the greater number have it.

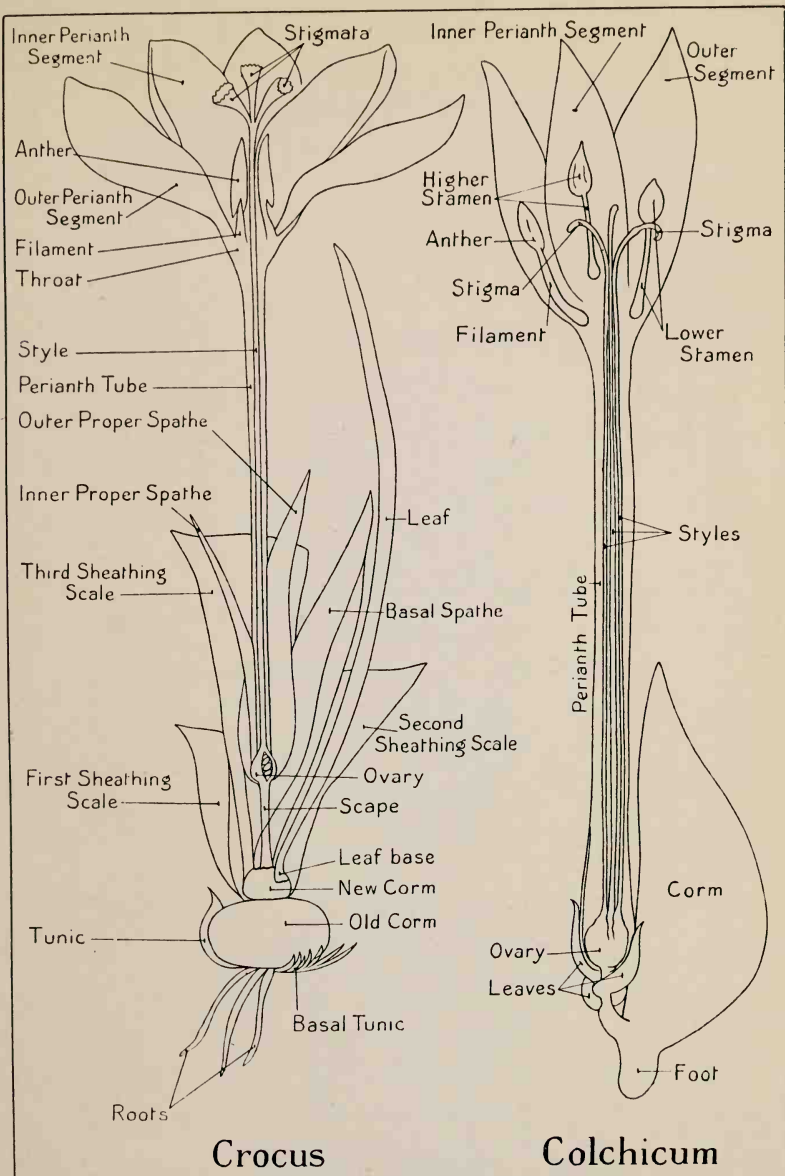
Proper Spathe. At flowering time the scape, or flower stalk, is very short and in some species almost sessile, but lengthens as the seeds ripen, so as to bear the capsule up above ground. The ovary is marked with purple at its top in many species, and growing out of its base will be found either one or two spathes of thin transparent membrane, that wrap the young bud until it emerges to open. The outer of these is tubular and the inner, when present, is generally strap shaped or ligulate. They are called the proper spathes and the presence or absence of the inner one affords good specific characters in most cases, but *CC. Salzmannii*, *serotinus*, *Imperati*, *Biliottii* and some varieties of *C. aureus* vary in this respect.

The presence of an inner proper spathe is described as *diphyllous*, its absence as *monophyllous*, and these two characters are correlated very markedly with the presence or absence of the basal spathe. All the known species of the *Nudiflori* have *diphyllous* proper spathes except *C. gargaricus* and *C. cyprius*, but six of the *Involucrati* are always *diphyllous* besides a few that are so occasionally.

Perianth Tube. The most remarkable features of a Crocus flower are the enormous length of the style and also of the tube that carries the flower above ground at flowering time. The latter is called the perianth tube and serves instead of a stalk.

They may be compared with the similar structures in a *Colchicum* and *Iris unguicularis*. The top of the perianth tube is called the throat and swells outwards from the point where the stamens are inserted on the three outer segments. The inner surface of the throat is either furnished with tufts of fine hairs, when it is called bearded, or is entirely glabrous, affording yet another very useful pair of specific characters, that only fail to be invariable in *C. vernus* and occasionally in some other species of that group.

The Perianth. The perianth is a botanical term for the sepals and petals of a flower taken together and regarded as surrounding the essential organs of reproduction. It is more especially used for those flowers in which the outer whorl of floral leaves, the sepals, are much like the inner whorl, the petals, and has been generally used for the Crocus, the three larger and outer floral leaves considered to represent sepals, being called the outer segments. These may be compared with the falls of an *Iris*, while the inner segments of the perianth, representing petals, correspond with the standards in the *Iris*. As a rule the outer segments of a Crocus are longer and more pointed than the inner, and in one, *C. iridiflorus*, they are so much longer and wider that the flower looks somewhat like an *Iris*.



THE PARTS OF CROCUS AND COLCHICUM FLOWERS.

In the greater number of species the outer surfaces of the three outer segments are either of duller colouring than their inner surfaces and also than both sides of the inner segments ; or they may be striped ; marked with featherings, that is striped with short lines branching from the main line ; or again freckled, or suffused, with darker markings. In the case of white or lilac forms these markings are purple, but in the yellow species they are mostly brown.

In all cases the duller or darker external coloration renders the unopened bud less conspicuous. The grey outer surface of *C. Tomasinianus*, may be compared with that of *Iris unguicularis*, for in both plants the closed buds are not easily detected on a dull day, but become very conspicuous the moment they respond to warmth or sunlight and display their inner surfaces.

The same sudden transformation occurs with *C. Imperati* and its relations ; the buff ground and dark purple featherings of their outer surface hide them until contrasted with the brilliant mauve of their interior.

This dull coloration when closed would afford protection from hungry predatory animals on their native slopes, but the same sunshine that would open them and render them conspicuous from afar, would entice the chilled insects out of their hiding places in search of pollen or honey. So the open and gleaming *Crocus* of a sunny hour attracts insects to assist in its cross fertilization, and with the return of chilly or dark hours, that drive the insects back to shelter, the *Crocus* shuts itself up into its former obscurity.

In some species, such as *C. susianus* and *C. Balansae* with much dark colour on the exterior, this change from conspicuous flashing colour to a cryptic blending with the surroundings is as complete as in the case of the Red Underwing Moth (*Catocala nupta*). On the wing the scarlet underwings render it attractive to birds, and I have seen the moth pursued by sparrows when I have disturbed it, but so soon as it settles on a willow tree, and the grey, upper wings are folded over the scarlet underwings, it is so nearly indistinguishable from the bark of the tree that the bird flies on looking for a scarlet moth.

The effect of external stripes or featherings may be compared with the markings of tigers, and just as the animal is protected by its similarity to light and shade in jungles of tall grass, so the flower resembles bare ground crossed by its own leaves or those of grasses as well as by their shadows.

The Stamens. The stamens are only three in number and vary very much among the species; the anther, as a rule, is about twice the length of the filament. When the throat is yellow so is the filament, except in *C. cyprius* and *C. Hartmannianus* in which it is scarlet. When yellow is absent from the throat the filaments are white, or slightly tinted with cream colour or lilac. In most species they are more or less papillose and in a few, such as *C. Tournefortii* and *C. pulchellus*, are covered with glandular hairs.

The anthers are mostly yellow or orange. In *CC. Boryi*, *Tournefortii*, *pulchellus*, *ochroleucus*, *zonatus*, *Karduchorum*, *vallicola*, *laevigatus*, *Veneris*

and a hitherto undescribed species from Palestine, they are white. In *C. chrysanthus* they frequently, but not invariably, show conspicuous black tips to the pointed barbs at the base, and in some forms of that species and a few others they may be variably stained with brown or grey.

In the variety *Foxii* of *C. hyemalis*, var. *micranthus* of *C. reticulatus*, in *C. Crewei* and a few others, they are quite black before dehiscence; but after the opening of the valves, and the liberation of the yellow pollen, the black is not so conspicuous. *C. aureus* has the largest anthers compared with its size and *C. Cambessedesii* possibly the shortest.

The Pistil. Owing to the length of the perianth tube the style is necessarily disproportionately long for the size of the flower, and may be compared with that of *Iris unguicularis*. In most species the style divides more or less at the level of the bases or summits of the anthers into three stigmatic branches which show such distinct variations of form and colour that their different types have been made much use of as specific characters.

On the strength of these variations Baker divided the Crocuses into three sections :—

1. *Holostigma*, with entire stigmata.
2. *Odontostigma*, with stigmata toothed or slightly divided.
3. *Schizostigma*, with stigmata deeply divided and branching.

Unfortunately this simple arrangement does not group the closely allied species together, and in some,

as in *C. longiflorus*, there is much variation in the amount of division of the stigmata.

The extreme case of undivided stigmata is seen in the cultivated form of *C. sativus* in which the long, red, club-shaped stigmatic branches are collected and dried to become the drug Saffron.

In *C. medius* the divisions are as fine as hairs and very numerous. *C. aureus* and *C. chrysanthus* exhibit good examples of toothed stigmata. Their stigmatic branches are more or less flattened or funnel shaped with short stigmatic bodies forming a fringe along the edge. Various shades of yellow, from cream colour to scarlet, occur in the stigmata and in some species, especially in *C. aureus* and *C. chrysanthus* individuals vary greatly in the range of colouring. The variety *leucostigma* of *C. vernus*, though otherwise richly coloured shows a kind of albinism in its white stigma.

Crocus nevadensis regularly has a colourless stigma. In *C. carpetanus* it is tinted with lilac, while in *C. iridiflorus* the finely divided branches are normally purple, but become straw colour in the white form.

In most cases the stigmatic branches overtop or spread beyond the anthers, and appear to be receptive for pollen at the first opening of the flower, and sometimes even before the dehiscence of the anthers, and occasionally protrude from an unopened bud. Thus the Crocus is somewhat protogynous, but the stigmata of unfertilised blossoms remain sound and receptive for some days after the pollen has been shed or the segments have faded. In gardens Hive Bees visit Crocuses to collect either pollen or honey. The honey

rises as high as the throat in the tube, and therefore much of it is available for an insect with a short proboscis. Autumnal species are much visited by the Silver Y Moth, *Plusia Gamma*. Hive Bees in search of honey generally alight on the showy and prominent stigmata, thus frequently dusting them with pollen adhering to their under surface and procured from another flower, and so effecting cross-pollination.

I have watched the flowers of *C. speciosus* in late September and have frequently observed bees alight on the outspread segments and proceed to the anthers to strip them of their pollen, which they do without coming in contact with the stigma. However, this may not be the case with the bees of the native countries of this *Crocus*. Bumble-bees generally grasp the stigmata upon arrival at the flowers.

The ovary is buried safely away below ground at the time of flowering but shortly after fertilisation is carried upward by the growth of its supporting scape or flower stalk, until it lies in the hollow of the surrounding leaves, just above the level of the soil where it is reached by light and warmth. Except in *C. caspius* and *C. Korolkowii*, in which the capsules remain below ground even after the seed is ripe, the scape elongates rapidly in May or June and raises the capsule above the leaves where, being dried by the sunshine, it splits into three valves and the seeds are scattered around the parent plant. The seeds vary in colour in the different species, those of *C. sativus* being deep crimson-purple. In *C. chrysanthus* they are red, in *C. biflorus* buff, and brown in *C. Korolkowii*.

Most of them have a fleshy caruncle, and judging by the distance from the parent at which seedlings frequently appear, I think they are carried off by ants, and perhaps worms, which eat this fleshy protuberance and assist in spreading the plants.

The result of our examination should teach us that the Crocus is an Irid as proclaimed at a glance by its having no more than three stamens, and confirmed on further observation by the position of the ovary below and outside the perianth tube; and by the division of the pistil into three branches.

It is useful to compare the flower with that of a *Colchicum*, a member of the Lily family, in which there are six stamens, the ovary is enclosed in the base of the perianth tube and the three pistils, though occasionally adhering for a short space of their length, are separate at their base and unbranched at their tips.

In the Crocus the most outstanding features are, the extreme reduction of stem and flower stalk and the consequent development of a long perianth tube: the keeled leaves with inrolled blades: and the protection of the ovary by its underground position. The reason for these modifications seems to me best understood if regarded as fitting the plant for a short period of active growth, in which it becomes fully prepared to do its work rapidly when the right time arrives after a long period of rest, and to make the most of short spells of fine weather in autumn, winter or spring. Thus the floral and foliar organs are completely formed before the drought of summer arrests activity and are ready to respond immediately to the

combined invitations of warmth and moisture. In the case of autumnal species, chiefly found at lower levels or in southern climates, this would be the coming of the autumn rains, and for alpine species, the melting of the snow in spring.

It is worth noting that although the flowers and leaves of such species as *CC. chrysanthus*, *vernus*, *aureus* and other spring-flowering species are as fully formed by August as those of *CC. speciosus*, *nudiflorus*, *cancellatus* and other autumnal species, no amount of forcing will induce the former to flower before the New Year and the latter will start to throw out their flowers at their accustomed seasons, even if kept unplanted in a dry atmosphere.

This may point to a southern, and possibly north African, origin of the genus, where the dominating condition was the early prevailing drought, before which growth must be completed, and that the wanderings of modified derivatives to high altitudes have been accompanied by their acquiring a fixed habit of remaining dormant until the melting of the snow.

The ancestor of the genus then might have been some *Romulea* or an intermediate form that could be the common ancestor of both. *Romulea* differs from *Crocus* mostly in the possession of a well defined flower stalk that raises the ovary above ground at flowering time, and also in the absence of a keel and rolled blades in the leaf. *C. carpetanus* in Spain, and *C. nevadensis*—common to Spain and north Africa—approach *Romulea* fairly closely as to the leaf structure,

and in the latter, the shape and shyness of opening of the flowers greatly resemble certain species of *Romulea*.

I should like to think that the *Crocus* as now known was derived from a *Romulea*-like ancestor, leaving links of its descent in *CC. nevadensis*, *Cambessedesii*, and through *C. minimus* and its allied species on the one hand developed to *CC. Imperati* and *etruscus*, and so onward to the reticulate section and such as *C. Sieberi*. While on the other hand through *C. versicolor* it would arrive at *C. vernus* and its closely related species.

C. carpetanus seems to lead nowhere, but again from *C. nevadensis* we can trace a resemblance in *C. Salzmannii* also common to Spain and Africa, and from it a chain through *C. Clusii* of Portugal to *CC. asturicus* and *nudiflorus*, autumnal forms found in western Europe.

In the curiously Iris-like *C. iridiflorus* we may see traces of a line of development which through *I. Sisyrinchium* led on to the Bearded Irises, in which the beard may be analogous to the tufts of hairs found in the throats of many *Crocuses*.

III.

THE SPANISH GROUP.

A DISTINCT group of five closely allied autumn-flowering species is distributed over south-western France to the coasts of Spain and Portugal, with one, *C. Salzmannii*, occurring both in Spain and Tangier.

These five lilac-flowered species may be distinguished thus :—

- | | | |
|------|--|------------------------|
| 1. { | Leafless at flowering time. | <i>C. nudiflorus</i> . |
| | Leaves developed at flowering time. | 2. |
| 2. { | Leaves just appearing with flowers. | <i>C. asturicus</i> . |
| | Leaves well developed before flowers. | 3. |
| 3. { | Tunic finely reticulated. | <i>C. Clusii</i> . |
| | Tunic membranous with parallel fibres. | 4. |
| 4. { | Flowers plain lilac. | <i>C. Salzmannii</i> . |
| | Flowers striped. | <i>C. serotinus</i> . |

C. nudiflorus was first correctly described by Sir James Smith in the first edition of the work generally known as Sowerby's "English Botany," the latter having drawn the plates. It is widely distributed in the Pyrenees and is the plant described as *Crocus pyrenaicus purpureus* in Parkinson's "Paradisus." Dean Herbert preferred that name on account of its belonging to his "Division I. *Involucrati*, species with a basal involucre or spathe"—while he designated

those without the basal spathe as *Nudiflori*. The name, however, refers to the absence of leaves at flowering time and this is a well marked feature of *C. nudiflorus*.

Occurring on both sides of the Pyrenees it is very plentiful in southern France near Bayonne, Biarritz, St. Jean de Luz, the Landes and Pau. In Spain it occurs in the Asturias, near Gijon and Santander.

I found it so plentiful near Bayonne that it was scarcely possible to dig up any plant without finding small corms of the Crocus in the soil. It is a very handsome and hardy plant but not often seen in gardens and seldom offered by nurserymen. This may be due to its curious method of increase by underground stolons, which hitherto has only been noticed in two other species *C. lazicus* and *C. gargaricus*, the former of which has never been introduced to cultivation. *C. gargaricus* forms recognisable and well-shaped, though very small corms at the end of thin white stolons; *C. nudiflorus*, however, bears such curiously shaped stolons that anyone seeing them for the first time might be pardoned for mistaking them for some evil form of stoloniferous grass, or even for the pupa of an insect.

They vary a great deal in size and shape, but in their first season are more or less vermiform, with bands and rings of darker skin of the nature of the tunic of a mature corm. They vary from half-an-inch to two or more inches in length, and in gardens seem to take two or three seasons to form flowering corms. For this reason a newly planted group may not flower

in the second year, nor for a season or two afterwards, but then may appear at some distance from the original site.

Thus it is best planted in borders or in turf, where it need not be disturbed and can be allowed to wander and colonise as it pleases.

The large, rich purple flowers appear in September, later than those of *C. speciosus*. They are larger than their nearest relative, *C. asturicus*, and may be distinguished by their brighter scarlet and more finely divided stigmata, glabrous throat, and a distinct edging of deep purple on the lower half of the three outer segments, as also by the absence of leaves, which though occasionally not very evident at first in *C. asturicus* may generally be detected just within the sheathing scales. Beautiful white forms are occasionally found, either without any tinge of colour or with blue markings at the throat.

The corm is rather small with a tunic of parallel fibre. Like the others of this group the basal spathe is present and the proper spathe monophyllous. The leaves, not produced until spring, are rather long and coarse.

It has become naturalised in several English counties and was at one time very plentiful in meadows near Nottingham ; but it is evident that it is not indigenous in Britain as it occurs nowhere in northern France. If it were more easily procurable it should be planted widely, and especially in grassy slopes and well drained meadows. There is a fine form, deeply coloured, large and early flowering, well established in the wild garden at Wisley.

C. asturicus was described by Herbert, but his acquaintance with it was imperfect and he is in error in stating that it produces its offsets on runners, and flowers later than *C. nudiflorus*. As I know it from mountains near Gijon in Asturias, it flowers before *C. nudiflorus* collected in the same neighbourhood. It is known there as "Espanta Pastores," "The Terror of Shepherds," as its appearance after the first autumn rains proclaims the coming of winter.

The flowers are smaller and more pointed than those of *C. nudiflorus*, vary in their shades of purple or lilac and are frequently slightly striped at the throat. White forms are very seldom found, but are very beautiful and desirable, especially when marked with purple at the throat.

It forms a round corm nearly an inch in diameter with parallel fibres in its thin tunic, and closely resembles *C. nudiflorus*, but can always be recognised by the tips of the young leaves appearing with, or soon after, the flowers, and by its bearded throat.

It grows well in open, sunny situations, but is much beloved of field mice. It promises to hold its own in meadow grass, but is not so robust a species as *C. nudiflorus*.

C. Salzmannii of Gay is a strong growing, large species, and remarkably hardy considering that it occurs in southern Spain, near Malaga and at Gibraltar, and in northern Africa near Tangier.

It forms the largest corms of any wild form of *Crocus* and they frequently reach a diameter of about two inches. The tunic is very abundant, soft and, for

the most part, membranous, rather like soft wood shavings, but contains fine parallel fibres. This soft tunic, and the size of the corm, unfortunately make it attractive to mice, and they will dig out a clump in late summer and soon leave nothing but the tunic. The leaves are four inches or more in length by the flowering time, which is about the middle of October, the flowers are freely borne, but though large are of rather thin substance and a washy pale lilac in colour.

What appears to be a more compact and better coloured variety is often listed as var. *erectophyllus*, and also as *C. graecus*—which is really a synonym for the Athenian form of *C. sativus*, known as var. *Cartwrightianus*. I have never been able to trace this form to a wild source, but as it appears to be intermediate between *C. asturicus* and *C. Salzmannii* it may come from central Spain. It varies occasionally as to the length of the leaves at flowering time and sometimes flowers while the leaves are dormant, and then looks much like a major form of *C. asturicus*.

C. Clusii of Gay is abundant in Portugal but occurs also in western Spain, and is therefore the most western of all Crocuses.

It grows in woodland, and makes a fine show near Cintra, Lisbon and Oporto. It is not very robust in cultivation and perhaps is more suited for a cold frame than the open ground, as it flowers in October.

The presence of long leaves at flowering time, its rather small, deep purple flowers and a reticulated corm tunic distinguish it from its neighbours. Variations of colour are not common, and a friend who

kindly searched for them on my behalf near Cintra found only two with white flowers, and one pale lilac form with fine featherings, among the hundreds then in flower.

C. serotinus was described by Salisbury and figured in t. 30 of his "Paradisus Londinensis," and also in t. 1267 of the "Botanical Magazine," but in both cases from garden specimens. It is described as representing the *Crocum Montanum* of Clusius from rocky places on the coast of Portugal. It is a mysterious plant, which was apparently fairly plentiful in gardens a century since, but is now very scarce, if not lost. The last living specimen I saw was in the collection of Crocuses grown in pots at Glasnevin. It is unknown at present from any wild source, and may be no more than a garden form of its nearest relation *C. Salzmannii*, with a late flowering habit and striped flowers. It should flower in November and December, and as I grew it in a cold frame twenty years ago was a very ornamental plant, but difficult to keep in health and vigour. The figures alluded to above are much too blue in colouring; as I knew it, it was a soft lilac with much branched featherings of a slightly deeper and more rosy shade on the outer segments.

Except in the feathered flower and its late flowering season it was much like the var. *erectophyllus* of *C. Salzmannii*.

IV.

EASTERN LEAFLESS AUTUMNAL SPECIES.

It is convenient to group together certain species whose chief common characters are that their flowers appear in autumn before their leaves, and that all (with the exception of *C. medius* from the Maritime Alps) inhabit eastern Europe, Asia Minor or Palestine.

In other characters they belong to widely different sections, but for recognition in the garden they may be distinguished by this rough key :—

- | | | | |
|----|---|----------|--|
| 1. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Segments approximately of the same size.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Inner segments much shorter than outer.</div> </div> | 2. | |
| | | | <i>C. iridiflorus.</i> |
| 2. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Flowers white.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Flowers coloured.</div> </div> | 3.
4. | |
| 3. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Throat all yellow.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Throat with two orange spots on each segment.</div> </div> | | <i>C. cancellatus.</i>
<i>C. vallicola.</i> |
| 4. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Flowers yellow.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Flowers lilac.</div> </div> | 5. | <i>C. Scharojanii.</i> |
| 5. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Tunic annulate.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Tunic not annulate.</div> </div> | 6.
7. | |
| 6. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Anthers yellow.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Anthers white.</div> </div> | | <i>C. speciosus.</i>
<i>C. pulchellus.</i> |
| 7. | <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Tunic reticulated.</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="font-size: 2em; margin-right: 5px;">{</div> <div>Tunic membranous.</div> </div> | 8.
9. | |

- | | | | |
|-----|---|-----------------------------|--|
| 8. | { | Proper spathe monophyllous. | <i>C. medius.</i> |
| | | Proper spathe diphyllous. | <i>C. cancellatus.</i>
var. <i>cilicicus.</i> |
| 9. | { | Yellow in throat. | <i>C. zonatus.</i> |
| | | No yellow in throat. | 10. |
| 10. | { | Proper spathe monophyllous. | <i>C. karduchorum.</i> |
| | | Proper spathe diphyllous | <i>C. Autranii.</i> |

C. Scharojanii was described by Ruprecht in Regel's "Gartenflora," in 1868. It has been found in but few localities in the Caucasus, originally near Mount Oschen, then on the Kroomdagh above Stauros near Trebizond, and again as lately as 1902 somewhere in the north-western Caucasus.

It is the only known autumn-flowering species with deep yellow flowers and has a very curious leaf in which the keel is as broad as the blade and so deeply grooved at the sides that it appears to be four-winged. This leaf structure is repeated in the closely related *C. vallicola*, also from the Caucasus, and in a less degree in *C. zonatus*, but in no other species.

In *C. Scharojanii* the leaves appear later in spring than those of any other species, and make up for it by remaining green and active until the flowers appear, about the first week in August. That at least is what they should do when growing satisfactorily, and it is evident that they need more shade and cooler summer conditions than other Crocuses. In my own dry garden in spite of all efforts to provide a suitable situation the leaves turn brown in the hot weather of late June or July and disappear too soon. This may be the cause of its dying out with us, for I fear that it is no longer in cultivation.

It makes a very small corm, always a bad sign and an indication of a species that relies more upon seed than root division for increase.

The flowers are large with segments about two inches in length and of a fine orange yellow, generally with long, sharp points at their tips. The anthers are cream colour and the stigmata orange and slightly toothed at their edges.

It is so beautiful, standing up on its tube of three to four inches in height, that although it flowers so early in August when other flowers are plentiful, it is worth growing whenever procurable.

C. vallicola was described by Herbert and is more widely distributed as a wild plant than the last, having been found in Armenia, Lazistan, Kurdistan, Georgia and the Caucasus. Unless it still survives at Glasnevin it is probably no longer in cultivation. I always found it a delicate plant here, making no increase and soon dying out, but Maw speaks of it as easily cultivated and Mr. Wolley-Dod used to succeed well with it in his stiff clay soil near Malpas.

The type form bears large creamy white flowers in mid-August. The segments are long for their width and terminate in a sharp point. They are veined internally with pale lilac and have two circular spots of bright yellow down in the throat.

Two varieties have been described, the first is var. *lilacinus*, a single plant of which was sent to Maw from Stauros, near Trebizond. It was smaller than the type and freely veined with lilac on both surfaces. There is a specimen of it in Maw's "Herbarium" at

the British Museum, but all trace of lilac has faded out of it.

The second is the plant described by Koch as *C. Suworovianus*, he having obtained it from Prince Konstantin Suworoff. Maw described it as a separate species naming it *C. Zohrabii*, but afterwards in his monograph treated it as var. *Suwarowianus* of *C. vallicola*, changing Koch's spelling of the name. I have never seen a living specimen so can only quote Maw, who grew it from corms collected on the Palan-Ducken range near Erzeroum. He found it flowered later than the type and bore rounder flowers, with a beardless throat and short, diphyllous proper spathes.

A very beautiful lemon-yellow *Crocus* was sent to Mr. John Hoog of Haarlem by a lady residing at Kutais in the Caucasus. She believed it to be *C. Scharojanii*, but except for its wonderful colour it agreed better with *C. vallicola*. Mr. Hoog kindly sent me a flower, and later a plant of it, which flowered here twice and then died. It might be a hybrid between *C. vallicola* and *C. Scharojanii* but until further material is available I think of it as *C. vallicola* var. *citrinus* and long for its re-appearance.

C. cancellatus, described by Herbert in the "Botanical Magazine" in 1841, has no close affinity with any other autumnal species. It lacks a basal spathe, has a coarsely reticulated tunic and finely branched stigmata, and varies from pure white to rich lilac, variously striped or feathered with purple. The leaves are generally dormant when the flowers appear but sometimes push up a little before they

fade, in much the same way as those of *C. asturicus*. It has a wide range from Greece to Persia, is found in Armenia, and parts of northern Asia Minor, and abundantly in Palestine, where it is one of the species collected for food, and sold in the markets of Damascus mixed with *C. Gaillardotii* under the name of Hursinein.

In Greece it used to be plentiful on the Lycabettos and other hills round Athens, and I had no difficulty in collecting it there in spring by means of its conspicuously white-lined leaves. In its western habitats it always has a white ground but in the Cilician Taurus and generally throughout Asia Minor the ground colour is mostly lilac. It is a very variable plant, and the Palestine forms include those with lilac or white ground colour, and Dr. Post mentions a pink form, which I have not seen.

Few plants have had more names given to them than the colour forms of this *Crocus*, but it is best to treat those described as having a white ground as synonyms of the type, and those with a lilac ground as the var. *cilicicus*.

Thus *CC. Schimperii*, *Spruneri*, *dianthus*, *nudiflorus* of Sibthorpe and Smith, *margaritaceus* and *Mazzia-ricus* are white forms, and *Pylarum*, *damascenus*, var. *persicus*, *edulis* and Herbert's var. *Kotschyanus* are more or less lilac as to ground colour and included under Maw's var. *cilicicus*. The Greek forms are the earliest to flower in the garden ; those from Palestine are the latest and consequently of but little use for out-door cultivation. Its striped forms are easily recognised when in flower being so much unlike any

other leafless autumnal species, but in the case of almost white varieties one has to look for the much branched yellow stigmata and the coarsely reticulated tunic to make certain.

There is a very distinct plant listed as var. *cilicicus lilacinus* that might rank as a distinct species should it be proved to come true from seed and have a distinct geographical range, for it differs from the other forms of *C. cancellatus* in having white instead of yellow anthers, and long, narrow segments that are inclined to reflex in sunshine, in contrast to the wider segments and globose form of other varieties. It also flowers in September before the white forms, and is of a distinctly rosy shade of lilac with delicate, unbranched veinings of a slightly deeper shade.

C. medius was so named as it was considered intermediate between *C. sativus* and *C. nudiflorus*. It is only found in the Riviera, especially behind Mentone, in the Maritime Alps near Tenda, above San Remo and as far south as Spezzia and eastward to Genoa.

It is a very handsome and hardy species, easily recognised in flower by its widely opening lilac blossoms marked in the throat with a radiating star of deep purple lines, only to be compared with those of some forms of *C. sativus* which however differ in having well developed leaves at the flowering time. Again the finely branched scarlet stigmata of *C. medius* are very conspicuous and distinct. It might be confused with *C. nudiflorus*, but that species lacks the purple star in the throat, and the coarsely reticulated tunic of *C. medius* would at once show it to be distinct.

In leaf too it is recognisable by its unusually conspicuous and wide, white central line. A fine white variety has appeared from time to time in Mr. A. C. Bartholomew's garden at Reading. It retains the purple star in the throat which with the scarlet fringed stigmata makes it very brilliant.

C. medius flowers here early in October when *C. speciosus* is going over and is a valuable plant for a sunny border.

C. zonatus of Gay, although closely related to *C. vallicola* in its leaf structure, cream coloured anthers, orange spotted throat and closely veined segments, is as easy to grow as *C. vallicola* is difficult. Its rosy pink flowers approach in colour those of some *Colchicums*, and like them generally appear early in September soon after the first heavy rains.

The corm is very peculiar, wider and flatter than those of other species, and never quite symmetrical in outline, having two or three slight protuberances on its outer edge. Its tunic is very thin and shining, and as the flowering shoot, encased in white sheathing scales, starts into growth by the end of July it is easy to recognise a corm of *C. zonatus* at lifting time. It also has a peculiar method of increase forming a quantity of small cormlets in clusters, I believe from the protuberances mentioned above. They are of the size and appearance of small grains of wheat, and so easily detached from the mother corm that they are difficult to collect in dry soil and therefore serve to spread this species into the stocks of others; and once in, it is a work of several seasons and much patience to clear the stocks again.

In some seasons, when the flowers push up suddenly after the first rains following a drought, they appear at first to be white, but after a day or two they change to the normal pink tone. This behaviour has now and then resulted in the listing of a white form that has more than once lightened my purse and undermined my faith in printed descriptions. It is curious that so free a seeder should not have produced a really white variety.

It grows wild in the Mountains of Cilicia, and in Palestine on Lebanon and Hermon. The name *zonatus* refers to the ring of orange spots in the throat, which are visible on the outside of a closed flower and very conspicuous in an open one. It will grow in any sunny border and will live in poor soil if planted deeply.

C. karduchorum was discovered by Theodore Kotschky as long ago as 1859, but was only known by his herbarium specimens until it was introduced to cultivation in 1910 from its home in Kurdistan. Maw's figure of it was made from the dried specimens and gives no real idea of its beauty. The flowers are larger than those of *C. zonatus* having wider segments with long, pointed tips. Their colour is a pale lavender with much more blue in it than in *C. zonatus*, but veined in a similar way with a deeper shade.

The chief difference besides this blue tone of colour is the white throat, entirely lacking the orange spots of *C. zonatus*, and the stigmata, which are yellow in *C. zonatus* are more finely divided and pale cream colour in *C. karduchorum*. The anthers also are cream coloured in *C. karduchorum*, but white in *C. zonatus*.



CROCUS KARDUCHORUM.

The sheathing scales are so long that the two uppermost enclose the monophyllous proper spathe, a peculiar character that is only found in one other species, namely *C. Autranii*.

Although it appeared to be a vigorous plant I have failed to establish it here, I believe chiefly owing to a very peculiar habit that caused the flowering shoot to grow to one side underground instead of straight upwards. Unless the soil was removed and the shoot and corm tilted upwards, it failed to reach the light and flowers and leaves rotted off underground. I tried planting on a very steep slope and covering it with loose sand but without success.

C. Autranii of Alboff differs from *C. zonatus* in its deeper purple flowers the absence of yellow spots in the throat, its white instead of yellow filaments, its brighter orange stigmata, and smaller rounder corm, and from *C. karduchorum* in having a diphyllous proper spathe and orange instead of cream-coloured stigmata.

Herr Max Leichtlin, shortly before his death, kindly sent me his only corm of this rare species, and I much regret that I was never successful in flowering it, before it eventually died. I therefore only know it from examining some of the specimens kindly lent to the British Museum for that purpose by the Curator of the Boissier Herbarium at Geneva, who also presented one specimen to our National Herbarium at South Kensington.

This examination revealed the presence of a basal spathe, which was not stated in the original descrip-

tion, and that, as in *C. karduchorum*, the innermost sheathing scale, is longer than the diphyllous proper spathes hiding them at flowering time. It was described from specimens gathered on Mt. Czipshiva in Abchasia, Transcaucasia, at an altitude of 7,000 feet, and the specimens sent for examination were labelled "Localité Crête Boybienne Mont Khoon pâturages alpines, 2. Oct. 1893."

C. iridiflorus is the name by which Heuffel described this fine species in Reichenbach's "Flora Germanica," in 1847, and it is so descriptive of the appearance of its flowers, that Maw uses it in his monograph, and has the confirmation of his choice in its acceptance in the "Kew Hand-list of Herbaceous Plants," published in 1902.

The Kew Index, however, selects the older name of *byzantinus*, used by Clusius and Parkinson, because Ker adopts it, but without a description, in the "Botanical Magazine" for 1808, under t. IIII. Herbert also used it, but it is so misleading that Ker's bare mention of it is surely best disregarded.

It is found in Hungary and Transylvania and not, as the name of *byzantinus* would imply, near Constantinople. It is the only known species in which the outer segments are twice as long as the inner. They are frequently of a rich purple while the inner may be nearly white. When fully expanded the outer segments often reflex while the smaller, inner ones stand stiffly upright and then the flower looks more like an Iris than a Crocus. From this peculiarity it has been placed in a separate genus by Schur under

the name of *Crociris iridiflora*. The outer segments are two inches or more in length and one in width but the inner are narrow and pointed, about an inch long and half-an-inch wide, generally much paler than the outer and veined with purple. It differs also from all other Crocuses in having light purple stigmata divided into narrow feathery threads.

There is a pure white form in which the stigmata are pale yellow. The late Mr. Allen of Shepton Mallet, who enriched gardens with many beautiful seedlings of Snowdrops and Scillas, also raised some fine varieties of this Crocus. One named "President" is very large and deep purple, "Rosamond" of a uniform pale lilac, and "Ruby," as the name suggests, of a good red-purple.

It is not often seen in gardens, but is a robust and easily grown plant if it be remembered that it is a native of woods and evidently requires more shade and moisture than other species. I find it thrives in soil that is chiefly peat or leaf mould in the position one would choose for a choice Hellebore or ferns, that is on the northern or north-western side of a boulder in the rock garden or under some small deciduous shrub. It has peculiarly broad leaves, slightly glaucous on the under side, but of a uniform deep green above, and without the central stripe of white that is so characteristic of most other species of Crocus. This breadth and dark colouring point to its preference for a shady situation.

C. speciosus of Bieberstein is widely spread in eastern Europe and Asia Minor, also extending as far

as Persia, being found in the Crimea, the Caucasus, Podolia, Armenia and near Astrabad.

It naturally follows that it should be variable, but best of all it is beautiful and hardy as well as plentiful. Left to go its own way it will spread freely in borders and even under deciduous shrubs, and then provides carpets and mimic pools of blue in September as rich as those of bluebells in May.

The corm is large and round, covered by a thin papery membrane, with conspicuous rings in the lower third, and if lifted when dormant in July or August will generally be found with a longer and whiter shoot growing from its summit than in any other species except *C. zonatus*. Though so distinct in corm tunic and other characters, both of these species increase rapidly by small cormlets, but these are formed round the base of the corm in the case of *C. speciosus*, a dozen or more of which may be found on a large corm. They are very slightly attached when dormant, and so difficult to collect if dropped into the soil, that it is wise not to grow *C. speciosus* near other annulate species if clean stocks are wanted. In a flower border this does not matter and helps to spread the drifts of this glorious Crocus, certainly the finest of all autumnal species.

The large flowers shoot up as though by magic a day or so after the tips of the white scale leaves pierce through the soil, and are of a peculiar blue tint of lilac which is made to appear even bluer at a little distance by the fine veinings of the inner surface of all the segments. These markings are peculiar to this

species, for a great number of fine, blue lines start out of the central vein and extend to the margins, and especially in the inner segments, appear to pass without a break behind the two secondary veins. The outer surface of the lower portion of the flower is generally marked with dark blue dots, so that either closed or open the general effect is bluer than in most Crocuses. The stigmata are very large and showy, divided into a mass of orange-scarlet threads, wonderfully conspicuous against the lilac and blue. The anthers are yellow, a character that at once distinguishes it from the closely related *C. pulchellus*.

A pure white variety was found by Mr. Van Tubergen among plants of a large and pale-flowered form collected near Schemacha and I have raised other white forms, not quite so pure, but perhaps all the more beautiful on account of a faint flush of lilac on newly opened flowers, and the presence of the characteristic veinings in a pale tint of bluish-lilac. A smaller and later flowering form with an extra amount of blue in it was at one time listed as var. *globosus* and is useful in carrying on the flowering season until November.

The largest flowered autumnal Crocus is a form of *C. speciosus* known as var. *Aitchisonii* in which the outer segments are three inches or more in length. It is paler than the typical form and less veined, of a pale uniform shade of lavender within, and almost white outside when in bud, and does not flower before mid-October.

Hybrids occur fairly frequently where *C. speciosus* and *C. pulchellus* are grown as neighbours, especially

if the late flowering form *globosus* is there. They mostly resemble *C. speciosus*, and show their *pulchellus* blood in white, or cream-coloured anthers and the substitution of a certain amount of yellow in the throat which is normally white in forms of *C. speciosus*.

C. pulchellus, in its blue and white forms was described by Herbert in 1841. It grows in Turkey near Constantinople, on Mount Olympus above Broussa, in the hills behind Salonica and on Mount Athos.

It is nearly related to *C. speciosus* but has a thicker, harder corm tunic, forms a smaller corm, flowers a fortnight later, and is very different in colour. The anthers are white, the stigmata yellow, or orange, throat orange and the pale lavender segments lack the parallel cross veining of *C. speciosus* and are only marked with five slightly branched bluish veins. The filaments are yellow and covered with fine hairs in *C. pulchellus* but white and glabrous in *C. speciosus*. It grows well in the open border but does not increase so rapidly as *C. speciosus*. The white form is of such good substance that it is perhaps the most beautiful of early autumnal albino forms.

Three imperfectly known species are inserted here, though for want of fuller knowledge I have not included them in the key at the commencement of this chapter.

C. hermoneus of Kotschy was gathered among melting snow near the summit of Hermon but in a fruiting state only. According to Dr. Post the leaves appear after the flowers, which are white with stigmata dissected into few threadlike lobes and appear in

October. Plants collected in Palestine for it had finely reticulated tunics instead of the thin membranous one of the original specimens and in Post's description. They bore thin, starry flowers, mostly tinged with lilac and looked like poor forms of *C. cancellatus*, and I think we have not yet received Kotschy's plant. These others were delicate in constitution and soon died out here even in the cold frame.

C. moabiticus of Bornmuller and Dinsmore, was first described as recently as 1912. It was collected by Mr. J. E. Dinsmore, of Jerusalem, at Zizeh in the plain of Moab, flowering in November without leaves. The flowers are small and white with purple stripes or tinted with light violet. The anthers are yellow and the long, nearly entire stigmata of deep orange are about as long as the segments. It has a basal spathe, diphyllous proper spathes, numerous and narrow leaves generally with glabrous edges, but occasionally armed with a few scattered teeth. It has not been introduced to cultivation.

From another district of Transjordanian some corms were collected as *C. cancellatus* var. *damascenus*. They flowered here last autumn and differ from *C. moabiticus* in having long leaves at flowering time in October, with ciliated margins to both blade and keel. The flowers were small and squat, dull white with lilac stripes and unless they improve with cultivation will be more interesting than beautiful—but it is not fair to judge from one season's trial.

V.

AUTUMNAL SPECIES FLOWERING WITH LEAVES.

THE autumnal Crocuses that have well developed leaves at their flowering time can be divided into two groups.

- (1) Those with ciliated margins to the blades and keel of the leaf, which form the sativus group dealt with in Chapter VI.
- (2) Those with smooth, generally termed glabrous, leaves.

Of these last CC. *Clusii*, *Salzmannii* and *serotinus* have been included in Chapter III, leaving ten species for this chapter. Six of these, *viz.* CC. *caspius*, *Boryi*, *Tournefortii*, *Veneris*, *hyemalis* and *laevigatus* are closely connected by their Eastern range and membranous tunics. The others differ widely in structure and habitat.

An artificial key to autumnal species with glabrous leaves produced before the flowers may be arranged thus :—

- | | | |
|------|---|------------------------|
| 1. { | Flowers banded or striped externally. | 2. |
| { | Flowers not banded or striped externally. | 5. |
| 2. { | Flowers large. | 3. |
| { | Flowers very small. | 4. |
| 3. { | Anthers black or yellow. | C. <i>hyemalis</i> . |
| { | Anthers white. | C. <i>laevigatus</i> . |

4. {	Stigmata overtopping anthers.	C. Veneris.
	Stigmata shorter than anthers.	C. Gaillardotii.
5. {	Flowers lilac.	6.
	Flowers white.	9.
6. {	Anthers yellow.	7.
	Anthers white.	C. Tournefortii.
7. {	Throat white.	C. Clusii.
	Throat not white.	8.
8. {	Throat yellowish.	C. Salzmannii.
	Throat orange.	C. longiflorus.
9. {	Anthers yellow.	10.
	Anthers white.	11.
10. {	Stigmata scarlet.	C. niveus.
	Stigmata yellow.	C. caspius.
11. {	Stigmata finely divided.	C. Boryi.
	Stigmata entire (more or less).	C. ochroleucus.

C. longiflorus is unfortunately the correct name by the law of priority for this remarkably fragrant species more happily named *odorus* by Bivona Bernardi. Its scent resembles that of primroses or of *Iris unguicularis* and is so strong that a few blossoms will scent a room. The only Crocuses that can rival it in fragrance are *CC. laevigatus* in winter, and *Imperati* and *suaevolens* in early spring. Moreover the flowers are not remarkable for their length but are generally rather globose with well rounded segments.

The monophyllous proper spathe is green and leaf-like in its upper portion, a character which, taken together with the scarlet, more or less divided stigmata and the orange throat and anthers should easily distinguish *C. longiflorus* from other lilac autumn

flowering species. It flowers in October and into November and is very hardy and reliable in the open border, although a native of southern Italy, Sicily and Malta. The tunic is coarsely netted and the nearly spherical corm about three-quarters of an inch in diameter.

The flowers vary a great deal in colour but I have never yet seen a white form. Pale lavender forms, with or without external purple featherings, frequently occur among my seedlings and encourage me to hope for a true albino some day. The typical form is a uniform lilac with a good deal of pink in it, but not so rosy as *C. zonatus*. The variety *melitensis* occurs in Malta and varies indefinitely as to the purple external markings of all six segments. They may appear as basal lines only, or as branched featherings reaching to the tips of the segments, or again as cloudy blotches on the lower halves. I obtained a few corms in 1895, which I believe came from the Berlin Botanic Gardens, as var. *Wilhelmii* which differ from the type by a paler ground colour, less regular outline and thinner texture. When crossed with the var. *melitensis* they have given some particularly pleasing seedlings. One of these which I gave to Mr. Herbert Chapman, of Rye, makes a very beautiful pot plant for the Alpine House, and when shown at Vincent Square as grown in a cold house received an Award of Merit under the name of var. *venustus*.

C. Tournefortii was named by Gay in honour of the great French botanist Tournefort. It is only found in the islands of the Greek Archipelago. It has the



CROCUS LONGIFLORUS.

$\frac{4}{5}$ natural size.

reputation of being somewhat tender, but I have found it easily grown here in well drained soil where it can receive all the sunshine available in October and November when it flowers. It makes very large corms of an inch or more in diameter that, in size and in the soft membranous tunic, closely resemble those of *C. Salzmannii*. Like other species with large corms it makes rapid increase by division and requires frequent replanting to prevent it becoming crowded and impoverished.

The flowers are very beautiful and in colour quite unlike those of any other species. Maw's figure does not do it justice in form or colour and looks as though drawn from a dried specimen. Fitch's plate,—t. 5776 of the "Botanical Magazine," under the name of *C. Orphanidis*—gives a better idea of it but misses the charm of the white anthers. The colour is difficult to describe tersely, it is a warm rosy lilac, with something of a pastelle or body colour effect about it, very different for instance from the clear transparent lilac of *C. pulchellus*. The inner surface of the flower is of a wonderfully uniform tint being very slightly veined, and the bright scarlet, finely branched stigmata, white anthers and bright yellow throat, give a wonderful finish to its charm. Once flowers open they refuse to close again, even more resolutely than those of some forms of *C. sativus*. Flowering so late in the season they frequently suffer from the effects of rain unless protected overhead. This habit possibly works satisfactorily enough in its native home, and is a hint to us that a cruise among those wonderful islands

would be blest by an autumnal repetition of halcyon days during the flowering season of this lovely Crocus.

Seedlings have shown very little tendency to vary, pale forms and one with fine bluish featherings, are interesting but no improvement on their really perfect parent.

C. niveus of Bowles was described as *C. marathoniensis* in 1876 and distributed as herbarium specimens by Professor Heldreich, of the Athens Botanical Gardens. Unfortunately the description is misleading in some points and the specimens are mixed, some forms of the really very distinct *C. Boryi* being included.

This led Maw to rank the plant as a variety of *C. Boryi* under the name var. *marathoniseus*, spelt thus with an "e." However, it was first gathered at Marathonisi, the ancient Gytheion in Laconia and so the spelling should be *marathonisius*.

I redescribed it as a new species in the "Gardeners' Chronicle" for 10th November, 1900, under the name of *C. niveus*, because Heldreich's description is incorrect as to the corm tunic which he must have described from that of *C. Boryi* as subcoriaceous and striate, whereas it is distinctly reticulated in *C. niveus*.

The presence of a basal spathe is not referred to by Heldreich, which again agrees with *C. Boryi*, and not with *C. niveus*. So it is a difficult question to decide what the correct name is. Dr. Britten told me Heldreich's name should stand, and I accordingly published a note to that effect in the "Gardeners' Chronicle," 19th January, 1901, but the late Mr. J. G. Baker often

told me I ought to stick to *niveus*, as it occurs in the first complete and correct description published, and I therefore restore it here.

Anyway it is far and away the most beautiful of all white flowered autumnal species, with flowers two inches or more in length, a rich orange throat and bright scarlet stigmata which make the purity of its whiteness the more dazzling. It has yellow anthers and green-veined, diphyllous proper spathes, and in all of its characters, except the diphyllous proper spathe, is more closely related to *C. longiflorus* than to *C. Boryi*, with which it has been confused. I find it a very hardy and robust plant that seeds freely, but flowers so late in the year—sometimes not before the end of November, and even into January—that it deserves the protection of a handlight at its flowering time. It has also been found on Mount Taygetus and Heldreich records it from Leucadia.

C. caspius of Fischer and Meyer is a comparatively recent introduction to English gardens. It was discovered by Hohenacker in 1838 on the western and southern shores of the Caspian Sea, but efforts to introduce it failed until Mr. C. J. Van Tubergen, of Haarlem, employed a collector to obtain it in 1902. He succeeded in finding it in Russian Talysch, southwest of the Caspian, south of Baku. Though coming from such a southern home and growing no higher than 1,000 feet above sea level under the shelter of low bushes, it has proved perfectly hardy and blossoms freely in the open ground.

At first the plants flowered over a long period from

October to February, but as they settled down they gradually became more regular and now make a good show in mid-October. It has a very smooth membranous tunic of a rosy shade of brown, a corm about the size of a hazel nut, diphyllous proper spathes, well shaped, globular, white flowers with rich orange throat, yellow anthers and orange undivided stigmata.

A few of the collected corms were of a rosy lilac tint and the most pronounced of these I described as var. *lilacinus* (but misprinted as *Lillaceus*) in the "Gardeners' Chronicle," 21st November, 1903. The white form is the more beautiful.

C. Boryi of Gay is a beautiful, creamy white species from Greece and Corfu. It is unfortunately delicate and I am afraid has passed out of cultivation, but if reintroduced would no doubt prove a good plant for the Alpine house. It is dwarf with very white central lines on the leaves, the flowers open widely in sunlight and are very distinct in their sulphur-tinted white colouring, with conspicuously scarlet, finely divided stigmata and white anthers. It grew well for many years here in a cold frame. There is a variety of it with lilac featherings but it is not so beautiful as the white form.

C. ochroleucus of Boissier approaches most nearly to the group of Spanish species in structure but is only found in Syria, in very rocky places on the Phœnician coast, on Lebanon and Anti-Lebanon and in Galilee. Maw's figure is larger and handsomer than any form I have seen in cultivation, and as he by no means flattered the flowers of other species one is led to hope that there may yet arrive a form to equal the figure.

It is a very hardy free-growing plant, making an abundance of small cormlets every season from many points on the surface of the old corm. If dug in deeply these youngsters appear to remain as vigorous as those more carefully planted. The corm is wide and flat, with a tunic of parallel fibres on a thin membranous base. It begins to flower after most other autumnal species, except *C. laevigatus*, are over, and therefore is a valuable though perhaps not very showy species. The first flowers to appear generally do so before their leaves, but the second flower from each shoot is accompanied by the rapidly developing leaves. The flowers are not quite white being slightly tinged with cream colour. In some the throat is very faintly stained with orange, in others it is brighter. The narrow segments, not much more than an inch long, are veined with lines that appear grey, more from being transparent than from containing any pigment. The white anthers distinguish *C. ochroleucus* from any albino form of the Spanish group, and the short leaves and yellow stigmata, generally but little divided, prevent its confusion with other white Eastern species. Dr. Post mentions a lilac form but I have never seen it.

C. laevigatus of Bory de St. Vincent is unique as to its corm tunic, which is hard and smooth, almost woody, and formed of one piece only which entirely covers the corm, splitting at the base into vandyked points that permit the roots to push out between them. So hard a substance decays slowly, and many layers of tunics may be found superimposed and pushed upwards by the growing corm. I collected some near

Athens that showed remains of fifteen tunics, the produce of as many years. The old ones become dull and leathery, but when cleaned away that of the last season's growth is so smooth that it resembles the shell of a hazel nut. If gently rubbed an outer skin may be removed and the tunic when quite dry is then of a peculiar light drab colour. This tunic is even more highly polished on its inner surface and its smoothness has provided the name of *laevigatus*, from the Latin *levis* = smooth. It is widely distributed in Greece, the Morea and the Cyclades, and is a very variable species. All those I collected had a white ground colour, mostly veined and feathered with crimson-purple on the outer segments. A few were pure white except for the orange throat and a band of soft butter-yellow on the outer surface of the three outer segments. Max Leichtlin sent me a large flowered form which I call var. *major* in which the ground colour is flushed with a very delicate lilac and there are purple lines on the outer segments. Seedlings from this vary slightly in the amount of purple markings but remain a distinct race. He also sent me as *C. Fontenayi* of Heldreich, a very beautiful form with bright rosy lilac ground and buff exterior, so richly feathered that it looks very much like a good form of the totally different plant *C. Imperati*. It differs from the typical *C. laevigatus* not only in its larger and more richly coloured flowers but also in flowering in December and onwards, whereas the white grounded forms commence flowering in October. It therefore seems best to call it *C. laevigatus* var. *Fontenayi*. It

seeds freely and seedlings retain its distinguishing characters.

C. laevigatus is one of the most fragrant species and would be excellent for a cold house, and is also so hardy that in spite of flowering so late in the season, it is a great ornament in sheltered nooks of the rock garden. Its white anthers and finely divided stigmata are much like those of *C. Boryi*, but its lilac or richly feathered flowers easily distinguish it. In its albino form, however, the curious corm tunic must be relied upon as the final court of appeal.

C. hyemalis of Boissier and Blanche is another species peculiar to Palestine and Syria and is plentiful round Jerusalem, Jericho and Bethlehem, at Aintab and Damascus.

It is only known in cultivation by a form that occurs near Jericho and in which the anthers are black and is the var. *Foxii* of Maw. As it comes from so far south and flowers in mid-winter it is best grown in a frame, and I have never been able to keep it in health for many seasons out in the open, but in the upper, and therefore drier, part of a cold frame it has ripened and flowered well for many years. It grows plentifully in the Campo di Pastori near Bethlehem, and one likes to think that the shepherds of Bethlehem listened to the first Christmas carol while resting on a field full of the flowers of *C. hyemalis*. Dr. Post describes the anthers of the typical form as brownish, but all my efforts to obtain any but the black anthered form have hitherto proved fruitless. The white, starry flowers are deep orange in the throat and vary much

as to the amount of purple spots or featherings on the outer segments.

A single corm of a closely allied species with white anthers was given to me in 1918, but seems likely to die out even in the frame. The white flowers have three stripes outside of a dark blue, not purple. It might be a variety or even hybrid of *C. hyemalis*, but it has white anthers, and if this is a constant character it should be regarded as a distinct species.

C. Veneris is a diminutive species only distinguishable from *C. Boryi* by its being half the size. It only occurs in Crete and Cyprus. I have seen living specimens grown by Mr. H. J. Elwes at Colesbourne, but believe it has not otherwise been in cultivation.

C. Gaillardotii of Boissier is another Syrian species and so far as I know not in cultivation, although it is said to be so plentiful round Damascus that the roots are gathered for food and sold cheaply in the market. It is the *C. aleppicus* of Baker and *C. intromissus* of Herbert. It has a finely reticulated tunic according to Maw and Herbert but Post describes it as of parallel fibres.

It must be an interesting species, with very small white flowers variously marked externally with pale lilac, divided stigmata shorter than the white anthers, and leaves that curl inward. The corm, too, should have a cap of curiously long chaffy points projecting above the tunic. It flowers in mid-winter and with such remarkable characters should be easily recognised and collected.

VI.

THE SAFFRON CROCUS.

CROCUS SATIVUS of Linnaeus is the Crocus of the ancient world, having been cultivated and prized from a remote period for the sake of its scented stigmata, which after careful drying provide the drug Saffron.

It has been, and still is, cultivated from Spain to Kashmir, was once largely grown in England at Saffron Walden, and has been introduced as a crop in some parts of America.

It is supposed to be the Karkom of the Song of Solomon, which is Kurkuma in Sanscrit, and Kurkum in Indian languages. Thus the consonants K.R.K.M. represent the root word in ancient Eastern tongues. When Phœnician merchants carried this precious drug about the world, nations speaking different languages would no doubt adopt the form of the name but alter the vowel sounds. Crocum is a form used by some Latin writers, and the Greeks turned it into *Κρόκος*. This in its latinised form Crocus, is our present-day name for the plant, though we use the Arabic word *Zà-ferán*, anglicised into Saffron, for the drug. Thus Crocus, with plural Crocuses, has become the familiar English name for the plant, and surely must be one of the oldest flower names in such common use, for although we have lengthened the sound of the first

syllable to that of omega instead of omikron, it is still the same word.

The drug was renowned for its medicinal powers, perfume and flavour, and as a brilliant yellow dye, and was always very costly. This is not strange if it is true, as Pevera states, that one grain of good Saffron contains the stigmata of nine flowers, so that one ounce would represent the produce of four thousand three hundred and twenty flowers. It is moreover not an easy plant to cultivate, being liable to attacks from parasitic fungi. Many of these outbreaks have been carefully investigated and form the subjects of publications. Again, both the flowers and the plants themselves are easily damaged by rough weather. So the high price it has commanded has always led to the invention of ingenious ways of adulterating it. Even in the days of Dioscorides and Pliny it was moistened, mixed with fat, or otherwise tampered with, and the latter tells us "Nothing is so subject to sophistication as Saffron and therefore the only trial of true Saffron is this, if a man lay his hands upon it, he shall heare it to cracke as if it were brittle and readie to burst: for that which is moist (a qualitie coming of some indirect means and cunning cast) yieldeth to the hand and makes no words."

During the middle ages severe laws were enacted against the adulteration of Saffron. The Saffron Inspectors of Nuremburg caused one Jobst Findeker to be burnt in the same fire as his adulterated Saffron in 1444: while in 1456 two men and a woman were buried alive for a like offence.

Yet it appears to have been a lucrative crop when well managed, and growers on the lower spurs of the Apennines have in some seasons made such profits that one year's harvest has exceeded the value of the land under cultivation.

The account of the Saffron industry at Saffron Walden as given by Miller in the "Gardener's Dictionary" is worth reading. He gives a table of charges and profits that show, at the price of thirty shillings a pound for Saffron, the net profits of an acre should be about five pounds four shillings a year, without counting any return for the sale of surplus roots.

The industry has long since ceased in England and now the greatest Saffron producing country is Spain. Flückiger and Hanbury give figures of the exports from Spain and state that in 1870 43,950 lbs. were imported into the United Kingdom, valued at £95,690.

Saffron is no longer used medicinally and retains a place in the pharmacopœia solely for its value as a colouring agent although otherwise superseded as a dye by less costly substances.

In Cornwall it is still much used for flavouring Saffron cakes.

Things were different in the year 1671 when John Ferdinand Hertodt published at Jena his "Crocologia," a duodecimo volume of nearly three hundred pages, to set forth the virtues of Saffron as a panacea. There was no disease known then that he did not profess to cure by a prescription in which Saffron was one of the ingredients. If one could but believe him the Plague,

melancholia, bites of venomous beasts, toothache or madness would yield to a treatment of Saffron. Many strange substances, such as worm-eaten wood of oaks, the fat of the mountain mouse, swallows' nests and dragon's blood, myrrh and aloes, henbane and opium and other powerful drugs, are included in his draughts and ointments ; but it is always Saffron that is the leading feature of the cure. It is even recommended as a dye for hair, should one desire it of a brilliant yellow, but the chemical blonde of the present day would no doubt consider peroxide of hydrogen a more certain agent.

Linnaeus seems to have been so much impressed with the importance of the Saffron producing *Crocus* that he regarded all others as mere varieties of it—and yet long before his date the cultivated plant had become a sterile variety that could only be propagated by root division and was nowhere to be found as a wild plant.

Like so many of our domesticated plants, for instance, Wheat, the Potato and the Florentine Iris, its origin is uncertain. The most nearly related form is one described by Parlatore as *C. Orsinii*. It only differs from the cultivated plant in the length of its stigmata, which do not hang out of the flower in the manner peculiar to the Saffron *Crocus*. It has only been recorded from three localities in the neighbourhood of Ascoli, in Italy, and though they are apparently in wild country it is not impossible that roots of the cultivated form might have been conveyed there from crops grown in that district.

The smaller flowered form common round Athens and in other parts of Greece and the Cyclades, known as var. Cartwrightianus, seems to be a possible parent of the officinal plant. It alone of all the wild forms known to me has the same habit of remaining open at night and in bad weather, and has the stigmata so disproportionate in comparison with the size of the segments that they protrude between them. I collected it many years ago on the Lycabettos to assist in making a selection, and though not in flower at the time, I found great variation in size and colour among those I brought home. Some of them are much like the Saffron Crocus in colour and markings, and make corms as large.

It seems to me quite possible, that if this plant were grown largely for the sake of its long, red stigmata, and those seedlings producing the longest were selected, it need not be many years before some form much like the cultivated Saffron Crocus could be found.

It seems best to regard several forms very distinct in appearance as no more than varieties of *C. sativus*. They are so variable that it is difficult to fix exact limitations and the following key is not infallible :—

The sativus group.

Involucrati, with diphyllous spathes, ciliated margins to leaves, finely reticulated tunics and scarlet, undivided stigmata.

- | | | |
|----|----------------------------------|----|
| I. | { Stigmata longer than stamens. | 2. |
| | { Stigmata shorter than stamens. | 3. |

2.	{	Flowers large.	The cultivated Saffron Crocus.
		Flowers small.	var. Orsinii.
			var. Cartwrightianus. Greek.
			var. Thomasii. Italian.
			var. Haussknechtii.
			Very pale. Persian.
3.	{	No yellow in throat.	4.
		Throat yellow.	6.
4.	{	Floral segments wide.	var. Elwesii.
		Floral segments narrow.	5.
5.	{	Flowers lilac.	C. olbanus.
		Flowers purple.	C. dispathaceus.
6.	{	Flowers generally lilac.	var. Pallasii.
		Flowers generally white.	C. hadriaticus.

C. sativus of Linnaeus. The cultivated Saffron produces its grey-green, narrow, ciliated leaves before the flowers appear in October. They have rounded segments that open out flat in sunshine and having once fully opened do not entirely close again, thus resembling those of the wild Greek form, var. Cartwrightianus, and a distinct species, also from Greece, *C. Tournefortii*, and they are consequently frequently damaged by rain. In colour they are of a dull reddish lilac, freely veined with a deeper shade especially at the throat. Their most noticeable feature is the peculiar pistil, so long that its branches hang down out of the flower and are a brilliant blood-red. They widen towards the tips and end in blunt, slightly toothed funnels.

The flowers are so handsome and distinct that they



CROCUS SATIVUS.

would be among the best for gardens were it not that the plant is remarkably shy in producing them except in places with a very hot summer.

It appears to require frequent lifting and division, and to appreciate rich but porous soil, and therefore is best suited in a sunny, sheltered bed where it can be treated as a kitchen garden crop rather than a border plant. If left alone for more than three years it will produce nothing but leaves, and the corms will dwindle to a quarter the size that they ought to attain if properly divided and manured.

One would like to believe the account of its introduction as given thus by Hakluyt, "It is reported at Saffron Walden that a pilgrim proposing to do good in this country stole a head of Saffron, and hid the same in his palmer's staffe which he had made hollow before of purpose, and so he brought the root into this realme, with venture of his life, for if he had bene taken by the law of the country from whence it came he had died for the fact." There is, however, reason for supposing that it was introduced to Britain by the Romans.

The variety *Orsinii* is only known from herbarium specimens, and it is much to be wished that living specimens could be found and introduced to cultivation. George Maw made three journeys to the neighbourhood of Ascoli in search of it but was unsuccessful.

The variety *Cartwrightianus* was described as a separate species by Herbert who named it after Mr. Cartwright, the British Consul at Constantinople. It is plentiful in Greece, and though small in flower, with

segments generally about an inch in length, it flowers so freely in English gardens that it is very attractive on sunny slopes of a rock garden in October and November. Some of the white forms, especially if starred with purple lines in the throat are particularly beautiful, and look better if mingled with the coloured forms than kept separate. The corm is at times as large as that of a well grown Saffron Crocus, and about an inch-and-a-half in diameter.

The variety *Thomasii* was regarded as a species by Herbert as *C. Thomasianus* but Tenore described it earlier as *Thomasii*. It is but little known in cultivation except from a few bulbs collected by Mr. Lacaita in 1900 at Gravinola, six miles north-west of Taranto in Italy. Some of these were sent to me by the kindness of the Director of Kew and I have been able to raise a few seedlings from them in some seasons. The corm is smaller than in the Greek variety, the flowers more slender with long and pointed segments, and the stigmata only slightly overtop the anthers. Otherwise they resemble var. *Cartwrightianus* in being of the same peach-blossom tone of rosy lilac, veined with purple especially at the throat, but they vary much less in range of colour.

The variety *Haussknechtii* is a Persian form and as known in gardens, a free flowering but flimsy textured variety. It is a great seeder and varies from a dull white to a pale washy lilac, and occasionally with faintly marked stripes. It is one of the poorer forms for garden effect but might give good seedlings if crossed with its handsomer relations.

The variety *Elwesii* is another Eastern form collected by H. J. Elwes and though thin in texture bears large flowers of pleasing shades of lilac obscurely veined with purple. At one time a good white variety was grown at Kew under the name of *C. sativus* var. *cashmirianus*, but I believe it has died out. The flowers of this variety vary in size and the best have segments an inch-and-a-half, or more, in length. The pistil is bright scarlet and shorter than the stamens.

A *Crocus* with very long and narrow segments and ciliated, thread-like leaves was distributed as *C. olbanus* in 1907. In its general characters it much resembles *C. sativus* var. *Elwesii*, chiefly differing in the shape of its segments which are about two inches long and but little more than a quarter-of-an-inch wide in the central and widest portion, tapering gradually to a point and each marked, especially on the inner surface, with nine darker veins. I cannot find any publication of the name and collectors are frequently silent or evasive as to the localities of their finds, and in this case the name has been spelt both *albanus* and *olbanus*. *Albus* = white, and *ολβος* = happiness, have given names to too many cities to help us much, and we must wait for further information. The soft lilac, starry flowers are so distinct in appearance that it is a pity the plant has proved a poor grower in most gardens. The only place I know of where it has thriven is at Gunnersbury, the happy home of many good plants.

Mr. George Egger of Jaffa sent out a very distinct plant as *C. Tauri* in 1912. Its long and narrow segments, and leaves fine as a hair, are much like those

of the so-called *C. olbanus*, but many remarkable characters point to specific rank for Egger's plant. The flowers are the deepest vinous purple of any *Crocus*, a curious shade in which brown madder and red are present. The deep orange pistil is unusually short, its entire stigmatic branches only just appearing in the throat much below the bases of the long, yellow, curving anthers, which are raised on reddish lilac filaments.

Its greatest originality, however, is the possession of a second basal spathe, which is one-and-three-quarters-of-an-inch in length, lorate and tapering to a fine point which projects above the outer sheathing scales, where it is matched by a second pointed scarious body, which on examination proves to be the tip of the innermost sheathing scale. It is tubular like ordinary sheathing scales to within an inch-and-a-half of its tip but then becomes open and lorate. I have never seen these characters in any other *Crocus*.

Unfortunately it is a very shy-flowering plant, and has almost died out here. It differs from others of the *sativus* group in having a single instead of a double proper spathe, but the ciliated leaves, entire stigmata and finely reticulated silky tunic, incline me to connect it with them in spite of its double basal spathe. I propose the name *dispathaceus* for it.

Forms with yellow throats.

C. Pallasii was a name used by Bieberstein for a form from the Taurus. Maw adopted it to include many forms, with pistils shorter than the anthers,

including the Italian var. *Thomasii*. Considering it better to use it only for those that have yellow in the throat I have excepted *Thomasii*. It will then include *C. campestris* of Pallas and Herbert from Roumelia, *C. visianicus* of Herbert from Dalmatia and forms from Corfu, Crete, the Crimea and Turkey in Europe. Those of them that I have grown have small, neatly formed flowers that do not open out quite flat, varying in colour from a rosy lilac to pure white. One very pretty form is rich lilac, with reddish throat and a white margin to the outer segments.

The white forms are very difficult to separate from *C. hadriaticus*.

C. hadriaticus of Herbert was known to him in two varieties.

Var. 1. chrysobelonicus, from the hill of Chrysobeloni, in Santa Maura, western Greece. Figures 8 and 9 of his plate XVII in the "Botanical Register" for 1847 show it as a medium-sized flower some two inches in length, white with yellow throat and red-purple lines at the base of the segments outside. It is figure 3 of Maw's plate, and I grow it here and find that, as Herbert states, it varies in the presence or absence of the red markings.

Var. 2. Saundersianus, Herbert describes as flowering earlier—in September instead of October and November,—and with larger flowers but otherwise similar to the Santa Maura plants. The throat he says is deep golden, sometimes unstreaked, sometimes stained with deep livid reddish purple. Figure 7 of the "Botanical Register," plate XVII, shows it as

a very handsome flower. Maw's figure represents a flower without yellow in the throat, but deep purple at the base inside and out, a form that I have never seen, and that looks more like a white form of *C. sativus* itself.

A form that generally throws up the flowers before the leaves has been described as *C. peloponnesiacus* by Orphanides in Boissier's "Diagnoses," but later Boissier placed it as var. B. of *C. hadriaticus*. I noticed it doing well in a bed of mixed Crocuses in Cambridge Botanic Garden, and when grown here it varied from year to year as to the length of leaves at flowering time. It has less yellow in the throat than the others, but is certainly a form of *C. hadriaticus*.

Seedlings from the var. *chrysobelonicus* vary with white or pale lilac flowers, or with fine purple lines on the outer segments and it is impossible, without knowing the parentage of the seedlings to divide them from some forms of *C. sativus* Pallasii.

All the varieties of this group make large corms when growing well, but they seem very liable to disease and attacks by subterranean insects, such as wireworms and the larvae of *Agrotis segetum*. An apparently healthy stock will suddenly fail and when lifted either empty tunics will be found, or corms so badly riddled with holes that they seldom recover.

VII.

THE VERNUS GROUP.

WHAT may be called the Vernus group consists of four very closely related species, and one (*C. Malyi*) which is best placed with them although distinct in tunic. *CC. vernus*, *Tomasinianus* and *banaticus* are of such near kin that it is very difficult to find any structural characters which can be relied upon to distinguish them, and in gardens each has produced hybrids with one or other species of the group. They are spring-flowering, having finely reticulated tunics, usually a basal spathe, a proper spathe of one bract only, flowers of many shades of purple or lilac, and rather wide leaves. They increase rapidly in suitable surroundings by the formation of small corms on various portions of the old corm instead of at the summit only as in so many species.

The normal forms of each species can usually be separated by their general appearance, but when intermediates are in question it is impossible to draw a hard and fast line. The following key should help to distinguish most examples, but variation in the characters referred to may occur :—

- | | | |
|----|--|------------------|
| 1. | { Throat beardless. | 2. |
| | { Throat bearded. | 3. |
| 2. | { Filaments and throat white. | C. banaticus. |
| | { Filaments and throat yellow. | C. species. |
| | | (Heuffelianus). |
| 3. | { Throat yellow internally. | C. Malyi. |
| | { Tunic fibres parallel. | |
| | { Throat white internally. | 4. |
| | { Tunic fibres netted. | |
| 4. | { Leaves tapering to both ends. | |
| | { Flowers March to April. | |
| | { Segments rounded, generally striped. | C. vernus. |
| | { Leaves linear. | |
| | { Flowers January to March. | C. Tomasinianus. |
| | { Segments pointed, unstriped. | |

Crocus vernus of Allione has such a wide distribution in central Europe, from the Pyrenees to the Carpathians, that as might be expected it is one of the most variable. Alpine heights of France, Switzerland, Italy and Tyrol are sheeted with diminutive forms, that together with *Soldanella alpina* pierce through the sodden brown turf even before the covering of snow has melted. I have often seen the *Crocus* flowers pressing upward against a thin layer of almost transparent snow, and a few hours afterwards widely open in the sunshine which melted away their last film of winter covering. On the St. Gothard the myriads of their white flowers imitate the last drifted patches of snow, and on the slopes of the Little Mont Cenis I have seen an endless variety of white, lavender, and striped forms that resemble Liliputian counterparts of many of the well-known garden favourites. Unfortu-

nately these small mountain forms do not grow well in lowland gardens, and generally die out after the third year of cultivation. On the other hand an equally minute form, known as the variety *siculus* of Tineo, from Sicily is not difficult ; and a rather larger, pure white one, with notched tips to its segments, collected by Mr. Dykes on Mount Veljun in Croatia, increases rapidly in the ordinary border.

The most beautiful and largest wild forms I grow were sent me lately by a generous friend who collected them at Vallombrosa, and many fine violet, purple, or striped varieties might be collected in the Neapolitan States and other parts of Italy. *C. vernus* has been a garden favourite for the last three hundred years. It seeds freely and it is hard to find two seedlings exactly alike. Most raisers of seeds are ready to see swan-like superiorities in their own seedlings compared with the mere geese of others' selections, so names beyond numbering have been bestowed on far too many varieties.

Some of these garden varieties of *C. vernus*, with the exception of the autumnal *C. speciosus* var. *Aitchisonii*, produce the largest flowers and are the most showy of all Crocuses. They are excellent for bold plantings among deciduous shrubs, either in one variety or mixed, for edgings to borders, and above all for naturalising in grass. Most Dutch catalogues provide a wide choice and I will only mention those that are particular favourites of mine.

Purpureus grandiflorus. An immense, royal-purple flower, glistening all over with natural polish. Late.

Madame Mina. Pale, soft lilac, beautifully striped with a darker shade. Early.

Kathleen Parlow. Absolutely pure white. A very long flower.

Montblanc. An old, but good, solid white form with a blue throat.

Margot. A cool lilac-blue, with pallid exterior. An elegant, well-formed flower.

Maximilian. In the same style as Margot but deeper in colour and larger. These two are best planted away from the striped or red-purple varieties, and look as though a dash of *C. Tomasinianus* blood had entered into their pedigree.

Botanical names have been given to several interesting varieties worth including in a collection though less showy than the garden ones.

Var. albiflorus—covers the small, white form so common on the St. Gothard.

Var. siculus—a minute, star-flowered form from mountains in Sicily and elsewhere. There is a form in cultivation that has no beard in the throat.

Var. leucorhyncus—a large and beautiful form that has become scarce. It is pale lavender with white tips to the segments, the purity of which is enhanced by purple markings shaped like double arches below the white markings.

Var. leucostigma—a very curious variety in which the rich orange-scarlet of the stigma has disappeared leaving it a creamy white. It also flowers much earlier than any other form of *C. vernus*, and is of a peculiarly blue-lilac in colour. Its origin is unknown



1. CROCUS TOMASINIANUS.
2. CROCUS TOMASINIANUS:
Var. pictus.

and it cannot be traced beyond a few old gardens.

Var. G. Maw is a quaint freak which has well-formed white flowers, each of the segments of which shows a thickened strip of bright orange running up its centre from the upper-third to the tip, of the same colour and substance as the stigmata. It was sent to George Maw by Miss C. M. Owen, who noticed it and several other monstrous forms in her garden at Knochmullen, Gorey, Ireland. Strange to say, it still retains its peculiarity.

C. Tomasinianus was so named by Dean Herbert after his friend Signor Tomasini of Trieste. Herbert always spelt the name of both his friend and the plant with a single "m" and the modern spelling of *Tomasinianus* is incorrect. This charming species replaces *C. vernus* on the east of the Adriatic, in parts of Dalmatia, Bosnia and Servia. As known in present-day gardens it has a short basal spathe and a bearded throat, but Herbert failed to find the basal spathe in those he examined, although he stated that he expected it might be found when a greater number of specimens were available for examination. Maw declared the chief distinction between *C. vernus* and *C. Tomasinianus* lay in the beardless throat of the latter, but I have never seen a specimen without the beard.

C. Tomasinianus has a slender flower bud due to the close wrapping of the segments, reminding one of a smart new umbrella compared with the thicker, clumsier buds of *C. vernus* which are more of the "Gamp" style. In most of its forms the exterior is

much paler than the interior, frequently in fact of rather an ashen grey with a dead, "wrong-side of the fabric" appearance that I have not noticed in any form of *C. vernus* except in Margot and Maximilian, which may have inherited this peculiarity from a cross with *C. Tomasinianus*. However with the first rays of sunshine all is changed, for the outer segments open and expose the clear lavender or amethyst shades of the inner segments, and when widely open the starry flowers make a wonderfully fine display.

It is a very early flowering species, generally opening in January and varies widely in shade from pure white to a glowing amethyst-purple that in some seedlings approaches nearer to crimson than I have seen in any other *Crocus*.

I have selected many charming seedlings to grow on into stocks, and one with white tips and purple marks below them and slight featherings lower still, has appeared at Vincent Square and received an award of merit. I call it var. *pictus*, as the white and purple markings look so much as though they are painted on to a pale flower. It appeared as a chance seedling in my rock garden, and I do not think it derives the painted tip from *C. vernus* var. *leucorhyncus*, as later seedlings have, but is probably a reversion to a form similar to one mentioned by Herbert as having a dark blotch.

Other seedlings show the influence of *C. vernus*, some so strongly that but for their early flowering and characteristic linear leaves they might be passed over as smaller forms of *C. vernus*.

C. Tomasinianus is one of the best for seeding freely and will appear along edges of paths and where rubbish weeded from the borders has been stacked, but is ever welcome except when it invades patches of other and rarer species. It is one of the plants that have received the Wisley Award of Garden Merit as worthy of inclusion in every garden.

C. banaticus of Heuffel comes from Hungary and Transylvania, but is not sufficiently robust and free of increase to become widely popular. It is earlier to flower than *C. vernus*, and as we know it is of a deep reddish purple, with a very distinct darker marking near the tip of each segment but on the outer surface only. The inner segments have a little notch in their tips which is very characteristic of this species, and together with its beardless throat helps to distinguish it from somewhat similarly coloured forms of *C. vernus*.

The leaves are less evident at flowering time than in its allies, and the general appearance of the plant reminds me of the autumnal *C. nudiflorus* and *C. asturicus*.

This is clearly the plant re-named by Herbert as *C. Heuffelianus* because Gay had already applied the name *banaticus* to another species. A most intricate web of mixed nomenclature envelops these Eastern species, and awaits someone with more time and patience than I should care to give to the tangle.

The confusion has been increased of late years by the importation from the Carpathians of a very beautiful, late-flowering species under the name of *C. Heuffelianus* which needs a new name.

It can be distinguished at a glance from the three foregoing species by the golden-yellow throat and filaments, and the rosy-lilac ground colour of its chubby, rounded flowers.

This close relative of both *C. vernus* and *C. banaticus* approaches the former in its rounded segments and the latter by generally having a beardless throat. I have detected a slight tuft of hair on the inner segments only, of one or two specimens, and there is no basal spathe in some others.

The extraordinary amount of variation shown by these four allied forms almost certainly indicates that they are derivatives from one original stock and have not yet become thoroughly fixed.

This Carpathian species is therefore of special interest and the additional character of yellow in the throat suggests great possibilities in future variation. Seedlings I have raised vary greatly. One is very handsomely marked with purple and flowers earlier than the others, its buds appearing before its remarkably wide leaves. I recommend this beautiful little species to those who will take up the work of raising seedlings.

C. Malyi of Visiani is limited to the Vellebit Mountains in Croatia, and has been collected on Monte Vermaz, Monte Orjen and more recently by Mr. Dykes above Carlopago, near Sinokos.

It is a handsome species with large flowers so slightly tinted with rose colour as to appear almost white, and a rich yellow throat more or less marked externally with brownish-red. It looks as though it were closely



CROCUS SPECIES NOVA :
Distributed as *C. Heuffelianus*.

$\frac{2}{3}$ natural size.

related to *C. vernus* but the yellow throat and filaments, the diphyllous proper spathes and a tunic of parallel fibres, distinguish it; and it stands alone with no congener. There is no difficulty in cultivating it as it is a sturdy species, flowering in March when others are on the wane. The leaves are very short when it begins to flower, and somehow or other it has the look of an autumnal, rather than of a vernal, species.

VIII.

THE IMPERATI GROUP.

CROCUS IMPERATI may be selected as the head of another group of closely related species, the most noticeable feature of which is the contrast in colour between their inner and outer segments.

When in bud or closed for the night, and when the weather is overcast they appear altogether buff or straw-coloured ; but directly the flowers open and the inner segments are revealed, the somewhat inconspicuous bud becomes a strikingly conspicuous flower. This is due to the bright lilac, rosy mauve, or occasionally pure white of the inner segments.

I should like to think that *C. Cambessedesii* is either the ancestral form from which this group has developed or a close relation thereto. If we trace their geographical distribution on a map of southern Europe it needs but little imagination to arrange something like a family tree for them.

We start at Majorca, in the Balearic Isles, the headquarters of the diminutive *C. Cambessedesii*. This species is so pallid in its internal tinge of lilac and outer wash of buff, delicately feathered with purplish grey, that it looks like a mere sketch of the richer colouring and greater size of the species that rather untruthfully possesses the name of *C. minimus*. We

move our pointer about one degree eastward on the map and touch Sardinia, the southernmost home of *C. minimus* which also extends its range northward into Corsica, where it abounds as the Crocus of the coast and lowlands. In higher ground it is replaced by its larger relative *C. corsicus* which is not found on the mainland of Italy. *C. etruscus* is the species found in the Tuscan Maremma opposite the northern half of Corsica and although some of its feathered forms closely resemble *C. corsicus* as to flower, the more coarsely netted tunic of *C. etruscus* shows it to be a distinct species. Further south in the environs of Rome it is the fragrant, star-shaped species *C. suaveolens* that represents the family. This is an extremely interesting plant when regarded as a link between its neighbouring species, for it inhabits a very limited region and shows scarcely any traces of variation. Yet with a little more colour in the stigmata and markings of the flower it would approach *C. corsicus* and *C. Imperati*, while a stronger mesh of fibre in the corm tunic would make it very difficult to separate from *C. etruscus*.

C. suaveolens does not spread into the district occupied by *C. Imperati* which stretches from the Bay of Naples southward into northern Calabria. Had it been otherwise it seems inevitable that hybrid intermediates would occur. A well marked form grown in gardens and whose source I have never been able to trace, strongly suggests a hybrid origin. It might however be a variant of a form of *C. Imperati* only found in the mountains of Sardinia, the wild type of

which has not yet been introduced to cultivation. Further particulars of these two forms will be found under *C. Imperati* var. *monophyllus* and var. *Sardoae*.

On the opposite shore of the Adriatic we find *C. dalmaticus*, a near relation of *C. etruscus*, which forms a link between the latter and the more eastern species *C. Sieberi* and *C. veluchensis*.

If we can imagine the existence of an intermediate form, now lost, we may trace another branch of this family tree from the Corsican *C. corsicus* and the Tuscan *C. etruscus*, ending in *C. versicolor* of the Maritime Alps ; for, although Maw states the contrary, Herbert in his masterly monograph recorded that there is " a pale tinge of straw-colour on the sepals " and I have some forms of *C. versicolor* raised from seed of wild plants collected near Mentone, that are externally of as deep a buff as any form of *C. Imperati*.

Herbert wrote " There is much affinity between *C. versicolor*, *Imperatoni*, *suaveolens* and *insularis*. They extend from Nice to Naples, . . . Corsica and Sardinia, and might be united as a group under the name *C. sub-apenninus*."

It is not easy to arrange a satisfactory key for species so similar in colouring, and so variable in markings.

The following may be helpful though not reliable in the case of some varieties :—

- | | | |
|------|------------------------------------|----|
| 1. { | Inner floral segments plain lilac. | 2. |
| | Inner floral segments white. | 7. |
| 2. { | Tunic with parallel fibres. | 3. |
| | Tunic reticulated. | 5. |



CROCUS IMPERATI:
Feathered and Plain Forms.

- | | |
|---|-------------------------------------|
| 3. { Flowers globular.
Flowers starry. | 4.
C. suaveolens. |
| 4. { Flowers large.
Flowers small. | C. Imperati.
C. minimus. |
| 5. { Tunic fibres coarse.
Tunic fibres fine. | 6.
C. corsicus. |
| 6. { Proper spathe monophyllous.
Proper spathe diphyllous. | C. etruscus.
C. dalmaticus. |
| 7. { Flowers small, inner segments plain.
Flowers large, inner segments feathered. | C. Cambessedesii.
C. versicolor. |

C. Imperati of Tenore, named in honour of Imperato, an Italian botanist, a very handsome and easily cultivated species from mountainous districts round Naples, is the largest flowered and most strikingly coloured of this group of Italian species. The open flowers measure three-and-a-half to four inches across, and vary a great deal in their colour and markings. The three outer segments are always tinged with yellow on their outer surface, ranging from a warm buff to pale straw colour, either self-coloured or marked with deep purple lines or feathering. In both cases the contrast of colour of the outer and inner segments is so beautiful that it is impossible to decide whether the more desirable form is the plain or patterned. A partly expanded flower of the unstriped form, sometimes listed as the variety unicolor, seems the perfection of blending in shades of rosy purple and soft yellow, especially when in a strong light both colours can be seen glowing through one another. A coloured plate in "The Garden," 19th July, 1913, from a drawing by Miss West shows

the beauty of this form. On the other hand there is a great charm in the rich crimson-purple markings and infinite variety of pattern of the feathered forms. The best forms have five main stripes, the upper portion of the central one and the outer edges of the others breaking away into shorter veinings like the pinnae of a feather. I have not been successful in growing-on pure stocks of these most striking forms and have come to believe that, unlike other Crocuses, *C. Imperati* has a habit of varying in its markings according to vigour and seasonal changes.

Three distinct white forms are in cultivation though still rather scarce. The first known was named var. *albiflos* by Herbert and is a true albino, every trace of purple having disappeared. It is therefore snow-white inside, with rich orange throat and stamens and fine scarlet stigmata. The buff of the outer surface has remained and gains in purity and beauty by its white backing. Herr W. Muller of Nucero, near Naples, recorded the finding of a few roots of this form in a chestnut forest, and suggested the varietal name of *nucerensis* for it. It is, however, the same plant as that figured in Maw's monograph from Herbert's beautiful drawing now in the Lindley Library.

In 1891 Herbert described two white varieties in the 67th vol. of the "Botanical Magazine," calling this pure white form var. *montanus*—as being found on mountains of 2,000–3,000 feet above sea-level near Naples.

He described as var. *albus* a form sent by Tenore

from Naples in which the outer segments were marked with three stripes, and this form, perhaps the most beautiful of all, grew in Mr. George Paul's Broxbourne nursery many years ago. Seedlings from it vary a great deal but a few in each batch reproduce the fine white and striped form.

There is another form sometimes offered in which the flowers are faintly flushed with lilac, and slightly striped externally. It is a weak grower and not so attractive as the other two.

A distinct variety has been grown in some Dutch nurseries for many years, and hitherto I have failed to trace its origin. It shows no tendency to vary, and only once in many years has it formed seed in this garden. These undesirable characteristics point to the possibility of a hybrid origin and that the whole stock has been derived by increase of corms from a single individual.

It comes into flower early in January, and unlike the wild forms, all the buds open within a week of one another instead of in a succession from late December to mid-March. They show the contrasting buff and lilac colouring, but the outer segments do not vary in their markings, there are no more than three purple stripes and the outer two never break away into featherings. The most marked botanical distinctions are found in the proper spathes, which are diphyllous in the Neapolitan forms and regularly monophyllous in this, and therefore it may be called the variety monophyllous. Its flowers are rather smaller and rounder in outline and paler in the throat, the perianth

tube longer, and the leaves shorter and more upright at flowering time, than in the typical form. It is a good border plant, quite hardy and appears punctually to brighten the dark days of early January.

Professor Martelli has described and figured a form from Sardinia as var. *Sardoae* in which the proper spathe is monophyllous, and it is possible that this garden plant may have originated from one collected in Sardinia. He describes it as having a pale lilac throat, but the curious antler-like branches of the outer markings, as shown in his figure do not agree with those of the variety monophyllous of Gardens.

All the forms of *C. Imperati* rejoice in a well drained, sunny situation and so are well fitted for sheltered nooks in a rock garden, and there the diphyllous forms sow themselves freely.

C. suaveolens of Bertoloni is so distinctly a poor relation of the rich and important *C. Imperati* that none but those in search of modest charm and botanical interest need notice it. It is found further to the north and altogether outside the region occupied by *C. Imperati*. Thus the latter may well be called the Neapolitan and *C. suaveolens* the Roman Crocus, being found in the Campagna, the val d'Inferno and the Botanic Gardens of Rome, and about as far south as Fundi. It is a slender, pallid likeness of *C. Imperati*, and but for its distinct habitat and conservative principles as to variation has little to distinguish it from that much more beautiful plant.

It seeds truly in cultivation and the stripes on the outer segments show no tendency to become feathered.

The starry outline, smaller dimensions, and a slight amount of reticulation of the upper part of its tunic not found in *C. Imperati*, are the most reliable distinctions between the two.

C. etruscus of Parlatore is easily recognised among the buff and lilac species by its coarse, netted tunic, which is even more wiry than that of *C. dalmaticus*, and is furnished below with a separate star-shaped, rayed disc, the basal tunic, which is absent in *C. dalmaticus*.

It is a native of the west coast of Italy and is only found in the Tuscan Maremma. It has a large well-formed flower, not so bright in colour as that of *C. Imperati*, and frequently more grey than buff in its outside colouring. It varies greatly in the extent of feathering, the most richly marked forms closely resembling *C. corsicus*, the plainest approaching *C. dalmaticus*.

Crocus minimus of De Candolle is by no means the smallest of the family, being larger in all its parts than its near relative *C. Cambessedessi*, and the equally diminutive *C. cyprius* and *C. Pestalozzae*. Wild specimens of *C. minimus* can generally boast of a length of an inch to an inch and a quarter for the outer segments, and some seedlings I have raised have flowers of over an inch and a half, while those of the others mentioned do not exceed three-quarters of an inch in length.

It may be described as an octavo edition, the diphyllous form of *C. Imperati* representing the folio, and *C. Cambessedessi* a duodecimo.

The buff ground of the outer segments of *C. minimus*

varies in the richness or entire lack of purple featherings, as much as in *C. Imperati*, and a pure white form has been found. It is plentiful along the west coast of Corsica and up to an altitude of about 2,000 feet, but is found in higher levels in Sardinia.

C. minimus is a sturdy little plant in cultivation, easily grown on sunny ledges of the rock garden, but does not increase freely except by seed. It flowers over a long period in its island homes from January to April, according to elevation, and most of those that have come my way seem to be from its higher habitats, as they are generally among the last *Crocus* flowers of the spring, frequently lasting on into the middle of April, with the white variety *lacteus*, of *C. aureus*, and the latest garden forms of *C. vernus*.

The richly feathered forms are very beautiful and the rounded ends of the segments give it a charm and distinction that always make it welcome even though its appearance heralds the close of another *Crocus* season.

C. corsicus of Maw was confused by most of the earlier writers with *C. minimus* and included with it under the name of *C. insularis*. It is the var. *I. major* of Herbert, and in his beautiful drawing t. 21 of Vol. 29 of the "Botanical Register" the two larger flowers at the back of the group are certainly *C. corsicus* and the others represent *C. minimus*.

It is common in the mountains of Corsica, generally at a higher level than that reached by *C. minimus*, and continues up to 7,000 feet above sea-level.

Its greater size, monophyllous spathe, finely reticu-



1. CROCUS CORSICUS.
3. CROCUS MINIMUS.

2. CROCUS SUAVEOLEUS.
4. CROCUS ETRUSCUS.

lated tunic, and paler flowers with conspicuously scarlet stigmata, distinguish it from *C. minimus*.

In the garden it is less effective than its relations and parsimoniously unobliging as to increase, either by offsets or seeds.

C. Cambessedesii was named after Jacques Cambessedes, a botanist who wrote a "Flora of the Balearic Isles" about a hundred years ago. One of the daintiest of all, this tiny species with leaves like fine grass and flowers less than an inch in length, looks as though the Fairy Queen had tried to make a Crocus for a doll's house.

It is found only in Majorca and Minorca in the Balearic Isles, but is plentiful there in woods and heathy ground, flowering throughout the autumn and until the end of March. This habit makes it rather tender for the open ground and it is best grown in an unheated frame, but although the long succession of flowers makes it interesting it prevents it making much show at any one time.

The flowers are pale lilac or white, the outer segments straw-coloured externally and variously feathered with delicate designs in deep purple. Brilliant scarlet stigmata give a final touch of beauty to a flower that in spite of its diminutive size is to the connoisseur of Crocuses what a miniature is to a life-sized portrait.

C. dalmaticus of Visiani although found on the eastern shore of the Adriatic and with much in common with a group of species spreading out to the eastward, yet has a certain amount of family resemblance with this group of Italian Crocuses, and forms a link between

them and those that may be centred round *C. Sieberi*.

Its strongly fibred, netted tunic and the absence of a basal spathe connect it with *C. Sieberi*, while the absence of any trace of basal tunic reminds us of *CC. Imperati*, *corsicus* and *minimus* in which the fibres of the main tunic are similarly continued to the base of the corm.

There are three distinct forms in cultivation—(a) with buff exterior, (b) of a uniform greyish lavender, and (c) flushed throughout with rosy lilac. Maw mentions a white form in the island of Lesina that still awaits the well-timed arrival of some keen-eyed collector. It must not be confused with the pure white form of *C. biflorus* var. *Weldenii*, which is plentiful in Dalmatia and has frequently appeared in lists as *C. dalmaticus* var. *niveus*.

The garden value of *C. dalmaticus* has been overlooked and it is too seldom planted. It flowers early in February and is generous with its blossoms, they open widely on mild days and set seed freely if visited by hive bees.

C. versicolor was described under this name in 1808 by Mr. Bellenden Ker, whose name was then Gawler. This change of name should be borne in mind when looking up references of that date, for names are followed by the words Ker, Gawl., or Gawler, each of which refers to this author.

The vol. XXVII of the "Botanical Magazine" contains his description together with a figure, t. 1110.

It is abundant along the French Riviera from sea level to an altitude of four thousand feet in the Mari-



CROCUS DALMATICUS.

time Alps, and extends from the hills east of the Rhone to the Italian frontier, and as far northward as Grenoble.

The markings of the flowers are very variable, but, except in a few white-grounded forms, a constant character is found in the feathered markings on the inner segments.

This is so unusual in Crocuses that it may be relied upon to distinguish *C. versicolor* from all other spring-flowering species.

Some forms of *C. vernus* have a few lines or featherings on their inner segments, but they are not so conspicuous on the inner surface as in the case of *C. versicolor*.

C. nevadensis has delicately branched lines on the inner surface, but is so distinct in all other characters, especially in the semi-cylindrical leaves, that it could not be confused with these others.

C. versicolor has parallel fibres in its tunic, a basal spathe and monophyllous proper spathe. In wild specimens the flowers are somewhat starry with narrow segments. Garden-raised seedlings show improvement in size; and beautiful forms with rosy suffusion or rich purple markings may be raised in a few generations.

The name *versicolor* is found in Parkinson's "Paradisus," and his Nos. 7, 8 and 9 most likely represent this species. Miller's Party-coloured Crocus and Broad-leaved Spring Crocus, are also forms of *C. versicolor*.

It was at one time a favourite garden plant and eighteen named varieties are included in Sabine's account of Spring Crocuses, published in 1830. Very few of these remain in cultivation at the present time.

A few lists contain, as the Cloth of Silver, an old form that was known under that name, and also as *C. versicolor* Morleon a hundred years ago. It has a white ground, slightly tinted with lilac and striped with purple. The best form is sold as var. *picturatus*, in which the contrast between the pure white ground and rich purple external stripes is very striking.

The variety *purpureus* is also obtainable but is rather dull in colouring, having somewhat indefinite veinings on a cloudy lilac ground. The anthers in this variety are generally malformed and at times altogether wanting.

Var. *picturatus*, pure white with rich purple feathering is the best form in cultivation.

IX.

THE EASTERN RETICULATE SPECIES.

C. susianus and *C. Sieberi* are the best known examples of this group. The latter is one of the three Crocuses that have received the Award of Garden Merit of the Royal Horticultural Society, a distinction instituted to point out plants that should be included in every garden.

The species may be distinguished as follows :—

- | | | |
|----|-------------------------------|------------------------|
| 1. | { Flowers lilac or white. | 2. |
| | { Flowers yellow. | 5. |
| 2. | { Flowers globular. | 3. |
| | { Flowers starry. | <i>C. reticulatus.</i> |
| 3. | { Throat lilac. | <i>C. veluchensis.</i> |
| | { Throat not lilac. | 4. |
| 4. | { Throat orange. | <i>C. Sieberi.</i> |
| | { Throat yellow or white. | <i>C. dalmaticus.</i> |
| 5. | { Flowers globular. | 6. |
| | { Flowers starry. | 7. |
| 6. | { Leafless at flowering time. | <i>C. gargaricus.</i> |
| | { Leaves with flowers. | <i>C. ancyrensis.</i> |
| 7. | { Flowers banded with brown. | <i>C. susianus.</i> |
| | { Flowers feathered. | <i>C. stellaris.</i> |

C. Sieberi of Gay is *C. nivalis* of Bory and *C. atticus* of later collectors.

The lilac, self-coloured form grows freely in the mountains of Greece and the Morea but in the islands of the Archipelago it is replaced by a very distinct variety with pure white interior and wonderfully variable external markings of rich red-purple. The typical lilac form is the better known, and being one of the easiest species to grow as well as one of the earliest to flower, should be included in every collection. The flowers vary in depth of lilac from the colour of an amethyst to a shade as pale as that of the old double lilac primrose. The rich orange of the throat and the scarlet stigmata give warmth and brilliancy to the general effect when open in the sunshine, though when closed the general tone is of rather a cold, bluish lilac. It has very wide leaves, with blades of a particularly rich but dark green that help to show up the broad, white, central stripe more distinctly than in any of its close relations, providing one of those blessed signatures Nature offers to observant gardeners who desire to keep their stocks true.

The Cretan and island form is unfortunately still a scarce plant. Few wandering gardener-botanists visit the islands where these beautifully varied forms are said to be plentiful, possibly because the mountainous wilds that would repay collectors are reputed to be unsafe for unarmed visitors.

It was introduced to cultivation by the British Consul at Canea who sent roots from the White Mountains in Crete to that prince of collectors and distributors Henry J. Elwes, and afterwards to George Maw. It is a robust plant and a vigorous grower but



CROCUS SIEBERI:

- | | |
|----------------------------|---------------------|
| 1. Var. Hubert Edelsten. | 2. Typical Form. |
| 3. Var. from Mount Kydnos. | 4. Var. versicolor. |

a very shy seeder, and is almost self-sterile, perhaps because our stocks are offsets from one original corm.

This suggestion is borne out by the fact that the wondrous pattern on the outer side of the outer segments was exactly similar in every specimen I had seen prior to 1907. In that year Mr. Reuthe of Keston, flowered two very beautiful seedlings raised from his own original stock, and from them I have raised other distinct variations.

This Cretan form, known as *C. Sieberi* var. *versicolor*, begins to flower in gardens only when the lilac form from the mainland is nearly over. It has a very characteristic and distinct way of pushing through the soil, the flower bud wrapped in its two papery spathes, appearing simultaneously with the tips of the leaves. It also differs in the great size of its pistil which is a good deal higher than the anthers, and divides into three widely opened funnels of an intensely brilliant orange-scarlet, very beautiful against the white segments and rich orange throat. The bands or stripes of the outside are of a crimson shade of purple or maroon unknown in any other *Crocus*.

My neighbour, Mr. Hubert Edelsten, succeeded in raising a very beautiful intermediate between the lilac *C. Sieberi* and its banded variety. It has a ground colour of soft rosy lilac, and the outer segments are externally tipped and centrally marked with crimson purple, the two dark areas being divided by a ring of white which extends to the edge in the lower half of each segment—as shown in figure I of Plate XI.

This form received a First Class Certificate of the

Royal Horticultural Society in 1924 as *Crocus Sieberi* var. Hubert Edelsten. It flowers freely and almost as early as the lilac form which was the pollen parent of the cross.

In 1923 I found two pure white youngsters among my seedlings, after thirty years of hopeful expectation.

The late Mr. Elwes gave me a beautiful form which he had from Mount Kydnos in which the upper lilac portion of the flower is sharply divided from the golden throat by a band of pure white; the result being a conspicuously three-coloured flower. Seedlings have varied in the depths of the lilac but all retain the white band and pure yellow throat. It flowers after the main display of the lilac type and before the variety versicolor but, as in the latter, the leaves are but little developed at flowering time.

C. veluchensis of Herbert can be distinguished at a glance from *C. Sieberi* by the absence of yellow in its throat and the more slender build of the flowers; the segments though longer being so much narrower. It also has a remarkably small corm, less than half as large as a well-grown one of *C. Sieberi*.

It is stated to be plentiful in the mountains of Greece and Turkey, and to occur in the Balkans, but has been so frequently confused with other species that one must be cautious in accepting the reputed stations. Maw is most likely correct in declaring that the plate in the "Botanical Magazine," t. 6197, represents *C. banaticus*, for he knew that the plants distributed by Max Leichtlin came from the Berlin Botanic Garden, where *C. banaticus* was grown under the name of *veluchensis*.



CROCUS VELUCHENSIS.

 $\frac{3}{4}$ natural size.

So far as I can trace, the true plant was first introduced to cultivation in 1905 by Mr. G. Reuthe who received it from an Albanian collector. I flowered it here the following year, and find that it has a weak constitution, like most Crocuses that form small corms. It has seeded and varies in colour, a few having appeared with pale buff outer segments, but the greater part are of a uniform pale lavender.

Sometime prior to 1912, the O'Mahony of Kerry collected a *Crocus* on Monte Rilo, in Bulgaria, that agrees in its structural characters with *C. veluchensis*, although in appearance it approaches *C. vernus*, especially in the polished surface and deep purple of its flowers. Somewhat similar forms have come to me under names to which they have certainly no right and it is likely that many beautiful forms of *C. vernus* or *C. banaticus* may yet come from eastern Europe.

C. reticulatus of Bieberstein ranges from the Adriatic near Trieste to the Caucasus and is consequently a variable plant.

It is unfortunately rather a weakling in cultivation and seldom holds its own in the open ground. It varies from lilac to white, and the outer segments are variously marked with stripes, featherings, or broad bands of purple. The starry shape of its small flowers together with its coarse, netted tunic afford the readiest means of recognising it.

At one time corms of *C. reticulatus* were collected and sold under the name of *C. Tauri*.

In the variety *micranthus* the flowers are less than

an inch in length and the anthers are generally dark grey instead of yellow.

A white form from Roumania is a dainty, little thing, but very delicate even when allowed the luxury of a cold frame.

C. gargaricus of Herbert is small and dwarf, but so brilliant in its rich orange colouring that it is one of the best of early flowering species. It has been collected in the Troad on Mount Gargarus, and on the Bithynian Olympus above Broussa.

The corms are very small and round and when of flowering age are about the size of a large pea. Many offsets are formed when the plant is happy, some of which are so small that they are hard to find. Even the smallest can be recognised by their finely netted coats, which are yellower than those of other species. The parent bulb throws out long, white runners which push away to the side or downwards for several inches and finally form small pilules of cormlets at their growing tips. By these means the offsets are formed away from the older corms and often get mixed among neighbouring plants. This increase by means of underground stolons is also found in *C. nudiflorus* and in *C. lazicus* but in no other species.

C. susianus of Ker, the Cloth of Gold Crocus, is an old inhabitant of Dutch and English gardens, having been sent to Clusius from Constantinople in 1587.

In the "Rariorum Plantarum Historia" he gives a vivid account of the withered condition of the roots when he received them in October, although they had been dug up in spring, as was shown by the dried

leaves and flowers still attached to them. It is pleasant to read his account of their progress and to learn that though leaves only were produced in the following spring his care was rewarded by flowers in 1590.

I have frequently had a like experience with collected Crocuses. If dug up in full flower, the new corms will generally be sufficiently developed to ripen well enough to grow, but not to flower in the following season. Sufficient nutriment generally remains in the old corm to build up a new one, but it is likely to be very small. It is usually safer to pack them for a long voyage as dry as possible, for if shut in an airtight tin while at all damp they will almost certainly rot.

In 1629, Parkinson described in the "Paradisus" the two varieties of the Cloth of Gold Crocus that are still grown, one with "three faire and great stripes of a faire deep purple colour" on the back of "every of the three outer leaves," the other differing only in having these outer segments "wholly of the same deepe purple colour on the back of them, saving that the edges of them are yellow, which is the forme of a Duke Tulipa, and from thence it took the name of a Duke Crocus."

There is a beautiful figure of *C. susianus* in the "Botanical Magazine," t. 652, that clearly shows one of its chief characteristics, the habit of reflexing under the influence of sunshine or the warmth of a room.

The name *susianus* is misleading as Susa, close down by the Persian Gulf, is beyond the limits of any Crocus, and the species in question has a rather restricted range in south-west Russia and the Crimea.

It is easily grown, and the starry, deep yellow flowers open widely on the sunny days of early February.

C. stellaris of Haworth is a mysterious plant known only in gardens and nothing at all like it has been found growing wild. It looks as though it might be a hybrid between *C. susianus* and some form of *C. aureus*, and Maw's objection that there is no authentic record of a hybrid Crocus no longer holds good.

I should like to believe that it is Parkinson's 26, *Crocus vernus versicolor pallideluteus*, though I should be loth to use such a name for it. He writes "we have a third sort of this kinde of cloth of gold crocus, which hath leaves and flowers like the former, but differeth in this, that the colour of the flower is of a paler yellow by much, but stript in the same manner as the first, but with a fainter purple colour: the roote also is netted like them."

It has become rather scarce of late, and I find it less vigorous than it was twenty years ago and possibly it is on the way to dying out.

When doing well it is an attractive flower owing to the five well-feathered stripes on the outer segments.

It is quite sterile and the anthers and pistil are evidently imperfect being very small and pallid.

C. ancyrensis of Maw, the Angora Crocus, was known to Dean Herbert who grew and flowered it at Spofforth, but looked upon it as a variety of *C. reticulatus*.

He was, however, decidedly a "lumper" where Crocuses were concerned, as may be seen by his re-

garding *C. susianus* and *C. dalmaticus* also as mere varieties of *C. reticulatus*. Maw was the first to describe *C. ancyrensis* as a distinct species. He rightly relied on its blunt, rounded segments to distinguish it from *C. susianus*, in which they are always narrower and taper to a point, but his description of them as "invariably self-coloured" is no longer valid. In 1901 I noticed one plant among many of the typical plain yellow, in which the outer segments were feathered with dull brown markings. It was marked and seeds saved from it and a strain of variously feathered and suffused forms has resulted. In one form which I call var. *suffusus* the general tint of orange is deepened by this suffusion and a very brilliant flower is produced.

C. ancyrensis is plentiful in central Asia Minor near Angora, Sivas, Kaisarieh and Marash. It is hardy and easily grown and one of the earliest of yellow species to flower, generally appearing here in January soon after the first blooms of *C. chrysanthus* have opened. In shape, size and colour it is so much like the wild type form of *C. chrysanthus* that it is not always easy to distinguish by the flowers only. Fortunately typical *C. chrysanthus* almost always has minute black spots on the barbs of its anthers which are not found on those of *C. ancyrensis*. The netted tunic of the latter and the smooth coriaceous tunic with basal rings of *C. chrysanthus*, distinguish them infallibly if they can be dug up for examination.

X.

THE AUREUS GROUP.

THE majority of yellow-flowered species belong to a group without a basal spathe, and with membranous tunics, which, towards the base, split up more or less into parallel fibres. They inhabit eastern Europe and Asia Minor with the exception of *C. Korolkowii* which is found in central Asia, in Bokhara, and as far as the northern frontier of Afghanistan.

They flower in spring, with leaves well developed, but *C. vitellinus* from Syria, which frequently precedes the others and is in flower before Christmas, may be regarded as the last of the autumnal species if we are ready to dissociate it from the evil smelling *C. graveolens*, generally regarded as a later flowering variety of it.

Other yellow-flowered species are dealt with among those with reticulated tunics, and there remain only the autumnal, naked-flowering *C. Scharojanii*, from the Caucasus, *C. lazicus*, which has not yet been introduced from Trebizond, and *C. chrysanthus* which belongs to a distinct group in which the tunics are split into rings at the base.

This aureus group is aggravatingly puzzling to botanists and has been much confused in the past, for some of the earlier describers were insufficiently

acquainted with the allied species to be able to point out the difference between them. Only a careful study of the wild plants as they grow in their homes can decide some of the points in question. For garden purposes it seems best to divide them into eight species which can be distinguished thus :—

- | | | |
|------|--|----------------|
| 1. { | The three stigmatic branches undivided. | 2. |
| | The stigmatic branches divided. | 3. |
| 2. { | Leaves few (about five), upright. | C. aureus. |
| | Leaves many (12 or more), spreading. | C. Korolkowii. |
| 3. { | Stigmatic branches divided into six threads. | 4. |
| | Stigmatic branches divided into more than six threads. | 5. |
| 4. { | Leaves narrow. | C. Suterianus. |
| | Leaves wide. | C. Olivieri. |
| 5. { | Leaves narrow. | 6. |
| | Leaves wide. | 7. |
| 6. { | Flowers sweetly scented. | C. vitellinus. |
| | Flowers with unpleasant scent. | C. graveolens. |
| 7. { | Tunic split into strands in lower half only. | C. Balansae. |
| | Tunic split into strong strands throughout. | C. candidus. |

Crocus aureus of Sibthorpe and Smith is the name selected by botanists from its many aliases for the wild plant that, at some distant period and in some unrecorded place, founded a clan of widely differing garden plants. Nearly all of these are now sterile and although the wild plant seeds freely no new, nor any

repetitions of the old forms, appear among the seedlings. This is no great evil, as the rich orange colour and early appearance of its flowers proclaim the typical form the best of its race.

It is the most western of all yellow species, ranging from western Asia Minor and the Dobrudscha on the east, as far west as Servia.

It has been regarded as the golden flower that cheered Oedipus in Colonos, but in spite of its inclusion in Sibthorpe's "*Flora Graeca*" it is excluded from Halacsy's later work and it is more likely that *C. Olivieri* was his messenger of hope.

It is an old inhabitant of English gardens, and the plant that Gerard received from Robinus of Paris, which he described as having "flowers of a most shining yellow colour, seeming afar off to be a hot glowing cole of fire." This is a good description of the deeper-coloured and best form, most likely the same that Parkinson in 1629 described as "of a deeper gold yellow . . . so that they appear reddish withall."

This was the only yellow *Crocus* known to Gerard before 1597 who stated that it was grown in our London gardens and that some of these wild Saffrons had been sent by Clusius. So although it reached Gerard from Robinus of Paris, it may yet have been the direct offspring of those Clusius received from Belgrade in 1579. It is often listed by nurserymen as *C. maesiacus*, a name given it by Ker; *Maesia*, or *Mysia Superior* being the classical name for Servia. It was known in old gardens as *C. lagenaeformis*, the Gourd-shaped, the name given it in Salisbury's



CROCUS AUREUS.

420 natural size.

"Paradisus Londinensis," where there is an excellent figure and description. Another good figure occurs in the "Botanical Magazine," t. 2986.

This rich orange form is worth acquiring for the garden under any name, and is the best yellow *Crocus* for planting in shrubberies, where it may seed and spread freely under deciduous trees and shrubs; for though it grows well in full exposure to sunshine, it does not object to shade after its leaves are mature. It begins to flower in January and continues till mid-March and is a fine sight on a sunny day. The corm tunic is a reddish brown membrane that splits, especially with age, into strong parallel fibres. The old sheathing leaves, whose bases form the corm tunic, turn a dark brown and remain intact longer than in other species, forming a cap, two or more inches in length, according to the depth of planting. This is very noticeable in the variety most commonly grown, the Dutch Yellow. Distinctive characters of all forms of *C. aureus*, except those classed under the variety *sulphureus*, are the great length and spreading position of the anthers. The stigma varies in colour from almost white to scarlet, but the three large, divergent anthers are sufficient to distinguish the true plant at a glance.

The white form, the variety *lacteus*, is not very robust and consequently scarce, but is a singularly beautiful and refined flower. The white has a gleam of yellow in it, yet is clear and in no wise muddy. It always reminds me of the charm of that flaxen-white hair that compensates so richly in age for the trials

of possessing red hair in youth. It flowers last of all the forms of *C. aureus* and together with *C. minimus* and some varieties of *C. vernus* generally provides the last *Crocus* flowers of each spring.

There was once a form known as *lacteus penicillatus*, of the same delicate ivory-white, but striped with a very peculiar greenish blue which is well figured in t. 2655 of the "Botanical Magazine." I have never seen it and fear that it has died out.

Another rare beauty which forms t. 3869 of the same work, is the variety *lutescens*, and can best be described as apricots and cream, the throat representing the apricots and the colour shading off upwards until it is no deeper than cream at the tips of the segments.

Dean Herbert wrote that four or five were found at Barton Park, in Suffolk, close to the place where *C. aureus* and some other species, doubtless remnants of an old garden, had succeeded in establishing themselves. At one time it had apparently disappeared from cultivation, but like many another rare plant was safely stored in Canon Ellacombe's wonderful garden at Bitton, near Bath. Here, at Enfield, it seems to be short-lived, but hitherto has reappeared occasionally from seed. I believe crossing the variety *lacteus* with typical *C. aureus* might produce similar seedlings.

The Yellow Dutch *Crocus*, also known as *C. luteus*, is the most widely grown of all forms and if a census of spring-flowering plants could be taken, would probably head the list as prime favourite. Although

its flowers are not so richly coloured, nor so early as those of the wild type it certainly deserves to be planted everywhere, from the window-box of a town house to the horticulturally trained landscapes of parklands measured by square miles. Except when attacked by mice or sparrows it seems to be indestructible, comes up all the stronger for being accidentally dug in to a great depth, and continues to flower even when its rapid increase has caused the corms to become a crowded mass of many superincumbent layers. In most gardens it provides the first blaze of colour on the brown soil of the bare borders, and offers the bees their first feast of pollen and honey.

It seems impossible to trace its exact origin. The name, Dutch Yellow, may be no safer guide than those of English Iris, or *Scilla peruviana*. The five flowers from one set of sheathing leaves as shown in Parkinson's figure 1, p. 169 of the "*Paradisus*," suggest this form, but in the text he states "the seede hereof is of a brighter colour than in any of the others." This applies well to the freely produced, crimson seeds of the wild *C. aureus*, but the Dutch Yellow as we now know it is sterile. Ray's Greatest Yellow Crocus "with flowers of a deep yellow but as large as the greatest purple, for which it is esteemed" seems to be the first unquestionable mention of it. This quotation is from his *Flora* of 1702 and he says further that it was raised from the seeds of the former, which is the true Crocus of Mesia, then "so common and well-known that it needeth no description." He describes the

flowers as "in some of a deep yellow colour, like a coal of fire, in others more pale, and there is one whose flowers are of a Brimstone colour," which certainly denotes forms of the wild *C. aureus*.

I have dealt lengthily with this common plant because it is one of the most extraordinary in cultivation. It is certainly of garden origin, nothing at all like it having been found wild. It appeared at least two hundred years ago, and possibly in more than one place and form, because there are at least three distinct stocks of it in cultivation, varying in the colour of the outer segments, both in a lighter and duller shade of yellow in some, and also in the length and depth of colour of the grey stripes invariably present, but most marked in the richer coloured forms.

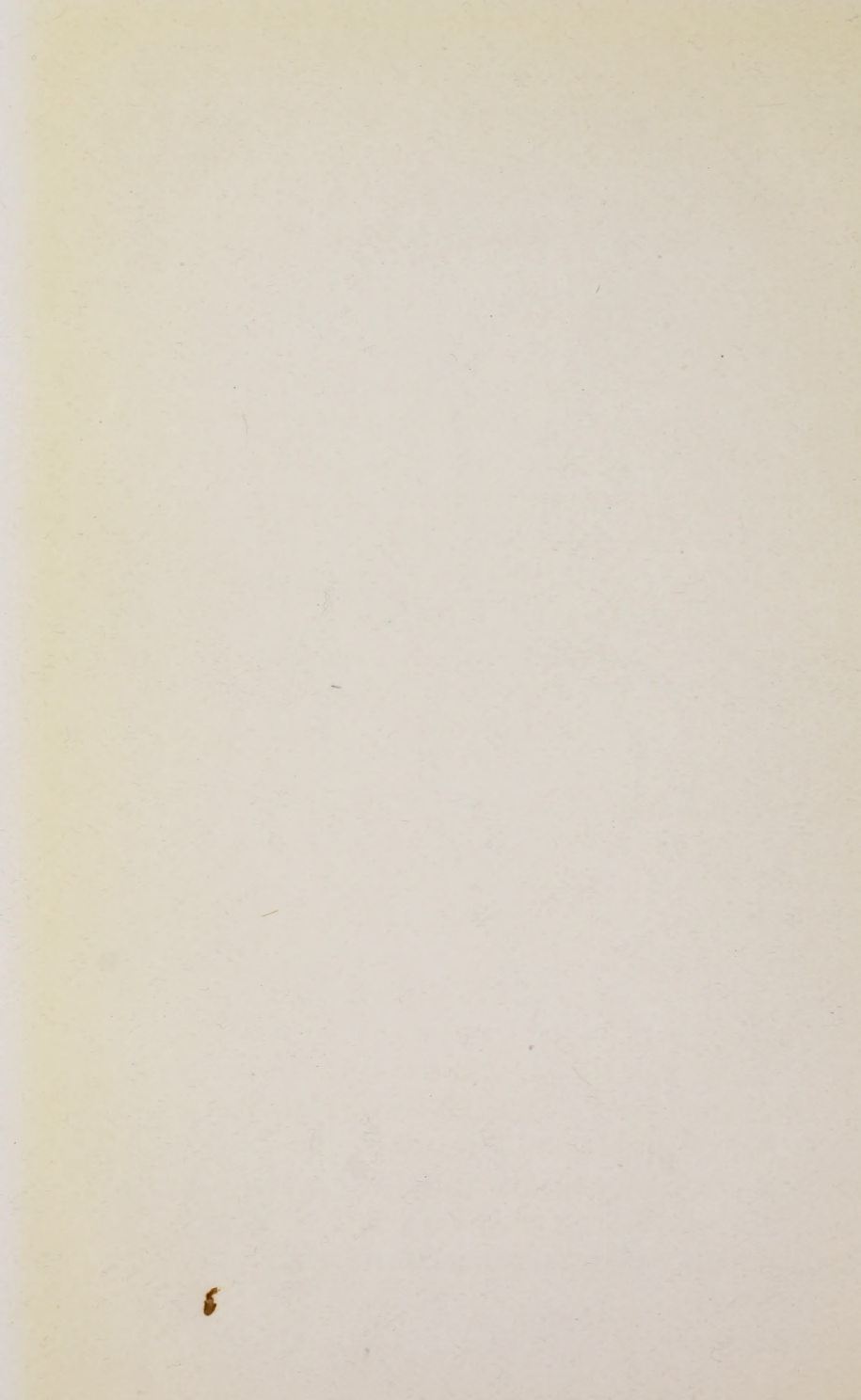
It is often stated that plants lose in vigour if propagated only by vegetative processes, such as cuttings or divisions. However, the Dutch Yellow and *C. sativus* retain undiminished vigour though they never produce seed. Parallel cases may be found in the old Double Daffodil, the Double Snowdrop and the Jerusalem Artichoke, all of which have been widely cultivated for centuries by division.

C. aureus var. *sulphureus*. Another and weaker race of seedlings must have been raised in gardens from *C. aureus*, possibly earlier than the large Dutch Yellow.

They are depauperate forms, forming smaller corms with narrower leaves and slender, pale coloured flowers. The best account of these is found in a paper by Joseph Sabine read in 1829 and published in Vol. VII of the "Transactions of the Horticultural



CROCUS KOROLKOWII.



Society" of which he was then the Secretary. He enumerates five varieties, one of which, *isabellinus*, I have not seen. He rightly recognises Parkinson's *C. vernus flavus striatus* as the *C. sulphureus striatus* so well figured in the "Botanical Magazine," t. 938. It has the best constitution of this race and is worth including in a collection, its straw-coloured flowers coming late in the season. His second variety, *striatellus*, is less distinctly striped with purplish brown and he admits has little merit, being a weak grower. I have only seen this in Miss Willmott's garden at Warley, and Sabine's verdict is too true for those she gave me have not flourished here.

C. sulphureus concolor, figured in the "Botanical Magazine," t. 1384, is still in cultivation and is of a pretty pale yellow without any markings, but not showy enough to be much sought after.

The last form known as the variety *sulphureus albidus*, or *pallidus*, is more curious than beautiful, the segments appear bleached at their tips and are also narrowed and somewhat malformed.

The most interesting feature of all four is the atrophied condition of the anthers, which are reduced to minute white arrow-heads and bear no pollen, whereas in all other forms of *C. aureus* the anthers are larger than in other *Crocuses* of their size.

C. Korolkowii of Regel might be called the Celandine *Crocus*, for its flowers are starry in shape when widely expanded and the inner surface shines as though newly varnished and is of a greener tint of yellow than is found in any other *Crocus*, closely approaching that of *Ranunculus Ficaria*, the Lesser Celandine.

The Russian General Korolkow discovered it in Turkestan and the first forms distributed by Dr. Regel, in 1882, are not robust in constitution, small flowered and stained externally with a faint brown freckling merging into dull green at the throat. I find great difficulty in keeping this form in health and have never obtained seed from it. *C. Korolkowii* was afterwards found on the northern frontier of Afghanistan and in 1901 was collected in quantity in Bokhara for Messrs. Van Tubergen of Haarlem. These collected corms were so flat and large that they were thought to be those of some *Gladiolus* ; but when they flowered in 1902 we were delighted with their rich purple and brown markings and the superior vigour of this race. They have since seeded freely and are hardy and free-flowering and, in most seasons, show flowers between Christmas and the New Year.

As might be expected from a *Crocus* from such an outlying habitat for the genus, *C. Korolkowii* shows many very distinct characters. Thus it has a greater number of leaves than any other spring flowering species, and the seed capsules, as in *C. caspius*, another Eastern species, do not appear above ground when ripe.

It has a tunic of fine parallel fibres which rise up into a long cap at the summit of the flat corms. The leaves spread out on the ground soon after their appearance, and the flowers are freely produced and very showy, being of such a distinct greenish yellow.

Forms richly marked outside with purple have been selected and listed as the variety *vinosus*, I have

raised a pretty sulphur form, and have selected, from collected roots, a very striking variety in which the back of the outer segments is brown with a narrow margin of yellow. It reminded me so much of the handsome water beetle *Dytiscus marginalis*, that I named it *Crocus Korolkowii* var. *Dytiscus*. It reproduces itself fairly truly from seed and seems a vigorous form increasing well in the open border. *C. Korolkowii* does better here in rather heavy soil than in a dry and sandy position.

C. Suterianus of Herbert was discovered by Mr. Suter, British vice-Consul in Caramania, and was described by Herbert in the "Botanical Register" in 1845 and figured by him as *C. chrysanthus* (*Bot. Reg.*, t. 4, 1847), the mistake being afterwards explained in his "History of Crocus," *Journ. Hort. Soc.*, 1847, p. 285.

It is found in central Asia Minor and but for its isolated habitat and narrower leaves might be regarded as a variety of the European *C. Olivieri*.

It is not common in cultivation, but is so generous, both with its deep yellow flowers and the increase of its corms, that if field mice could be reduced to the status of the Dodo and Great Auk this *Crocus* might be in every rock garden.

It should be lifted and replanted every third year, or else the corms become crowded, into superimposed layers. Such a patch is very attractive when in flower, but the crowd of corms lifted so close to the surface is too great a temptation to a mouse for the safety of the *Crocus*.

C. Olivieri of Gay was named after a French traveller and botanist, M. Olivier, who was the first to collect it in the island of Chios in the Ægæan Sea. It is also found in Greece, Roumelia and Roumania, and I have received living roots of it from near Salonica. Though a dwarf and small flowered species, with segments only about an inch-and-a-quarter long, it is so free-flowering and of such a brilliant shade of orange as to deserve a good place in the rock-garden. In both this and the last species each of the three stigmatic branches are divided into no more than two thread-like divisions. This character easily distinguishes it from the other wide-leaved members of this group, *CC. Balansae* and *candidus*, in which the divisions are more numerous. The leaves are quite a third-of-an-inch in width at maturity but those of *C. Suterianus* are never wider than a quarter-of-an-inch. Maw writes of a difference in the corm tunics, but does not explain it. He also states that the keel of the leaves is ciliated all over in *C. Suterianus* but only on the edge in *C. Olivieri*. I have not found this constant or reliable, and can only divide them according to the width of leaf and certain characters of the flowers that are scarcely distinct enough to be of botanical value, but catch my gardener's eye. I notice that the narrow-leaved forms have more globular, deeper coloured flowers, with light purple stripes on the perianth tube and a stain of brown or grey at the base of the segments, as in Herbert's figure. My Greek, wide-leaved, true *C. Olivieri* has more pointed segments and no trace of brown or purple on tube or throat.

C. Balansae of Gay is found in western Asia Minor near Smyrna. It may be distinguished at once from *CC. Olivieri*, *Suterianus* and *candidus* by its earlier flowering and the deep orange stigmata which are divided into twelve or more fine threads instead of the six only of the others, and from *C. candidus* also by its smooth membranous tunic.

It is very variable in its external markings, but uniformly of a yolk-of-egg yellow within. I have never seen it without some lines, or suffusion of purple or brown on the tube, which markings generally reach to the tips of the outer segments as featherings or freckling. Its most striking form has a complete external suffusion of rich mahogany brown on the outer segments, so dark that brown madder shaded with purple-lake must be used to reproduce it in paint. The flowers are generally less than an inch in length but well formed, with rounded segments, and expand freely on sunny mornings. I always feel that it deserves the adjective 'jolly,' more than other Crocuses, especially when in a half-opened state so that the deep purple-red of the exterior contrasts with the orange within. Other forms are pleasing, especially those with well marked bronze feathering, but everyone picks out the brown and yellow variety as first favourite. It seeds freely in most seasons and seems to prefer rich and moist soil so long as it is fully exposed to the southern sunshine. The broad leaves are worth examining through a lens on account of the silvery hairs scattered over their upper and under surfaces. It begins to flower early in February and produces a long succession of flowers.

C. candidus of Clarke inhabits the Troad, the modern Bigha—a Vilayet of western Asia Minor. It has been collected on Mount Gargarus, one of the heights of Ida, and in the valley of the Scamander now called the River Mendore. The white form was the first to be described and cultivated, but it is a very variable species, and pale yellow and deep orange forms are now in cultivation, some of which produce both white and yellow seedlings.

The yellow and orange forms are not easy to distinguish by flowers and leaves only from *C. Olivieri* and some varieties of *C. Balansae*, though the leaf of *C. candidus* is generally wider than theirs. The corm tunic, however, comes to the rescue of the puzzled gardener. Nature fortunately designed it in a lighter shade of brown, almost drab when dry, and it generally shows strong ribs of parallel fibres from the base to its sharply pointed cap. Messrs. Van Tubergen raised seedlings at Haarlem some of which had a yellow ground colour and distributed them under the name of *C. candidus* var. *sub-flavus*, and two years later I found similar varieties among my seedlings. When looking through Maw's "Herbarium" at the Natural History Museum I recognised a sheet of specimens collected by Sintenis at Thymbra, in the valley of the Scamander, as a yellow form of *C. candidus*. As hitherto it had only been known in the white form they had been placed among the unrecognised species. In 1911 Mr. Mountain of San Stefano, Constantinople, sent Messrs. Barr a few collected bulbs from a district "some 50—60 miles from Mount Olympus." The Bithynian



CROCUS CANDIDUS :

Var. subflavus.

$\frac{3}{4}$ natural size.

Olympus is about 150 miles from the valley of the Scamander, but a collector does not always give the exact distances and localities to those who seek knowledge. When these flowered they proved a fine, deep orange form of *C. candidus*, which has been listed as var. *Mountainii*. It seems to me that Herbert's *C. lagenaeformis* var. 8, *Landerianus*, from Kurchumlu Tepe in the Troad, with orange or yellow flowers includes these forms and they should be called *C. candidus* var. *Landerianus*.

In cultivation *C. candidus* flowers among the latest Crocuses, and in cool ground continues to the end of March and in late seasons into April. The wide leaves and freely produced flowers make it a very attractive and distinct plant for borders and the rock garden, and where weeding and hoeing are not too assiduously practised it will sow itself freely. Whether the ground colour is white or yellow, the outside of the flowers is generally freckled and veined with blue, purple or brown, in endless variety. A cream-coloured form that has appeared here is one of the most floriferous of all Crocuses. I suspect *C. candidus* of hybridising with other species, having found its characteristic strongly ribbed tunic on certain chance seedlings whose origin I cannot otherwise explain.

C. vitellinus of Wahlenberg is plentiful in Palestine, near Beyrout, on Lebanon, at Scanderoun and near Sidon. It is reported from N. Syria, near Aleppo, and even in the Cilician Taurus, but these latter records may refer to *C. graveolens*.

The Palestine plant is the best and bears fragrant

deep yellow flowers from mid-December onward. The segments are narrow and pointed and as it is the only orange flowered species with much divided stigmata which flowers at that period it is easily recognised. The tunic is smooth and of a reddish brown, splitting, at the lower edge only, into a fringe of narrow points. The leaves appear before the flowers and are narrow with ciliated edges to the blades and keel.

The outer segments are marked with dark bronze stripes in some forms, but the ground colour should be as rich and bright as the inner surface, and the throat should taper gradually down to the tube.

C. graveolens of Boissier and Reuter has been treated by Baker and Maw as though it were only a variety of *C. vitellinus* with brown markings, and has been collected and distributed of late years under that name. Boissier described it as having narrower leaves that spread on the ground, and longer proper spathes reaching to the throat instead of ending below it. He lays stress on the way the flower opens out into a flat star instead of remaining bell-shaped, and also on its heavy odour, like that of Elder. He gives Gebel Nahas near Aleppo, and Beilan as its habitat, and it seems likely that *C. graveolens* is the more northern and *C. vitellinus* the southern plant.

As I know it in cultivation it is quite distinct from *C. vitellinus*. The two are not in flower together as *C. graveolens* is never earlier than mid-February. The throat swells out considerably above the tube and there is a very noticeable waist or constriction in

the lower third of the flower while in *C. vitellinus* the segments taper gradually to the throat. The stellate manner of opening noted by Boissier is very marked as the segments open out from above the waist very freely on sunny days. The outer segments are generally paler on the outer than the inner surface and many are striped or feathered with brown ; but forms in which the outer surface is of a plain straw colour are not uncommon. *C. graveolens* would however be recognisable anywhere without these characters, by the abominable odour that is perceptible, even at a distance of some yards, when its small flowers are open on a sunny day. Boissier flattered it by the mild name *graveolens* and comparing its scent with Elder. It reminds me of the horrible odour of *Cytisus purgans*, that has unfortunately descended to its hybrid offspring *C. praecox* and *C. Kewensis*. The *Crocus* has an added whiff of black-beetles as well, and in most seasons the first indication I receive of its being in flower is this pungent odour which reaches my nose before the yellow of the flower catches my eye.

Dried specimens retain this scent for many years ; and it even defiles the paper in which they have been pressed, in much the same way as Petrel eggs scent the drawer in which they are kept.

XI.

ANNULATE CROCUSES.

THE ANNULATE CROCUSES form a group in which the lower third of the corm tunic splits into a series of narrow rings that just overlap each other, and although generally straight-edged below, are armed upwards with stiff teeth that assist one ring to adhere to another. Two species, *C. pulchellus* and *C. speciosus*, flower in autumn and are dealt with under another section.

Two of the vernal species, *C. Tauri* and *C. Dandfordiae*, are not in cultivation and the remaining species are among the most difficult to distinguish clearly, on account of their great range of variation in shape and colour, and their capacity for crossing with one another.

George Maw thought it likely that *C. aërius* and *C. chrysanthus* hybridised when growing intermixed on the Bithynian Olympus, and they most certainly do so in gardens as well as with some varieties of *C. biflorus*. This makes it impossible to draw a sharp line between these three species and the following key will only apply to the more characteristic forms of this bewildering trio.

Spring-flowering annulate species :—

- | | | |
|------|------------------------|----|
| I. { | Tunic thick and hard. | 2. |
| | Tunic thin and papery. | 6. |

- | | | |
|----|---|-------------------|
| 2. | { Flowers tapering downwards gradually
without a distinct waist. | 3. |
| | { Flowers generally with a distinct waist. | 5. |
| 3. | { Anthers black. | C. Crewei. |
| | { Anthers yellow. | 4. |
| 4. | { Filaments spotted with black at the base. | C. Pestalozzae. |
| | { Filaments and anthers without black spots. | C. biflorus. |
| 5. | { Anthers with grey centres. | C. isauricus. |
| | { Anthers generally with black barbs. | C. chrysanthus. |
| 6. | { Filaments yellow. | 7. |
| | { Filaments scarlet. | 8. |
| 7. | { Flowers globose with a distinct waist. | C. aërius. |
| | { Flowers long without a waist. | C. Tauri. |
| 8. | { Flowers small, proper spathe monophyllous, rings of tunic without teeth. | C. cyprius. |
| | { Flowers longer, proper spathe diphyllous, rings of tunic armed with strong teeth. | C. Hartmannianus. |

C. biflorus was so named by Miller in that marvellous example of one man's work, "The Gardener's Dictionary." He distinguishes it thus—"Crocus with two flowers in each spatha." We find, however, in his further description that he uses the term spatha loosely, sometimes correctly for the proper spathes but also for what should be termed the sheathing scales. So he writes of *C. biflorus*—"with a few narrow leaves which are closely wrapped round by a spatha or sheath, out of which arise two flowers." This plainly refers to the sheathing scales and could be said of the greater number of species; but we must

bear in mind that Miller was comparing a free-flowering form of *C. biflorus* with the Saffron Crocus and what is in part *C. nudiflorus*, and some forms of *C. susianus*, none of which are so free flowering.

C. biflorus as generally grown is an old garden form, called the Scotch Crocus, which most likely originated as a seedling in some Scottish garden and was introduced from thence into England and Holland. Nothing very closely resembling it has been found in a wild state, and like other old garden varieties it is sterile and increases rapidly by corm division.

It has larger flowers than other striped varieties of *C. biflorus*, a yellow throat, white ground colour, with five more or less feathered, blue-purple stripes on the outside of the outer segments. It is well figured in t. 845 of the "Botanical Magazine." Such a hardy, early and free-flowering variety deserves planting in large groups, where its white flowers can open out in the morning sunshine. It has no fads as to soil so long as it is not water-logged.

Var. Parkinsonii of Sabine is *var. lineatus* of Herbert. A smaller variety, with rounder flowers and a similarly obliging habit, is offered by nurserymen as *praecox*, *argenteus* or under a combination of the two names.

It may be further distinguished from the large variety by a shade of creamy-buff on the outside of the outer segments, which moreover have only three instead of five conspicuous stripes. It is pure white within with a rich orange throat and conspicuous scarlet stigmata.

Sabine in his paper in the "Transactions of the Horticultural Society," for 1830, figures this form as *C. biflorus Parkinsonii* seeing in it the *C. Vernus Striatus Vulgaris* of Parkinson's "Paradise." It is not unlikely that it was the parent from which the Scotch Crocus was derived after Parkinson's day.

Var. argenteus. Sabine's *argenteus* and the seedling he raised from it and called *argenteus praecox*, figured in his plate as No. 5, are not often found in gardens, but seem to me to be forms of the wild variety found plentifully round Florence and in other parts of Italy.

Their distinguishing features are described by Sabine and Herbert as narrower segments, pale lilac within, and with three purple lines on the outside of the outer ones.

Near Florence it varies and a form without stripes on the outer segments is known as the variety *estriatus* and is a charming plant for the rock garden. The creamy-yellow exterior of the outer segments is very pleasing in contrast with the soft lilac of the rest of the blossom and it is curious in flowering much earlier than the striped form. I have raised seedlings from it, and though a large proportion reproduce the variety *estriatus* I obtained about five per cent. of the striped later-flowering form, and in some batches of seedlings one or two of a beautiful little albino, pure white except for the band of straw-colour on the outer segments. If self-fertilised this white form breeds true and is valuable for the rock garden as it flowers latest of all the varieties of *C. biflorus*.

This sequence in flowering has been perfectly regular

ever since I have grown these varieties and is a very curious fact seeing that all three are but forms of one.

It is very difficult to reconcile the views of Herbert, Sabine and other writers as to the *C. pusillus* of Tenore and its varieties. Herbert treats it as variety 6. of his *C. annulatus* of which he makes *biflorus* the variety 1.

Herbert places *argenteus* as sub-variety 2. of *pusillus*. His description clearly fits the wild Italian plant which I find produces the variety *estriatus*. Though it is difficult to say exactly what Tenore and other writers have included under the name it seems best to retain it for a small, starry-flowered Italian race of *C. biflorus*. That sold by nurserymen as *pusillus* is generally white in ground colour, with a faint tint of buff and three to five narrow, purple lines on the outer segments.

This must be the "smallest with the clearest white ground" that Herbert says is found at St. Rocco, near Naples, and which he calls sub-variety *Tenoreanus*.

The smaller varieties from Naples with the blue tint mentioned by Herbert may be a form that I bought as the variety *minor*, and was the same as the form naturalised in Barton Park, Suffolk, and figured by Haworth in "English Botany" Supplement, No. 2645, and is the original of the plate 1497 in Sowerby's "English Botany," vol. IX, 1883.

Mr. Whittall sent to Kew some small forms collected near Smyrna, thought to represent Herbert's variety *nubigena*. They varied greatly in external markings and some were closely akin to *pusillus*. They have

poor constitutions and are likely to die out in cultivation.

Var. Weldenii is the Dalmatian form and an altogether bolder and more beautiful plant than the Italian varieties. It ranges away to the eastward into Servia and Bulgaria and varies from pure white within and without, Herbert's variety 5. *albus*, through forms with a light freckling of blue on the outer segments, to extreme forms in which the entire outer surface, except a narrow white margin, is of a deep lustrous purple, and then becomes the variety *Alexandri* figured in t. 7740 of the "Botanical Magazine." This handsome form was described by Herbert as variety 4. *purpurascens*, and his plants were sent to him from Dalmatia, but those collected of later years are from Servia and Bulgaria. Among the collected forms are some with poor, star-shaped flowers and others with blue freckling or feathering replacing the rich purple, and I can see no definite dividing line between the varieties *Weldenii* and *Alexandri*. Both make splendid garden plants, flowering rather late in February and on till March, the large glistening white flowers looking especially beautiful when half opened so that the outer segments show the various shades of lilac or purple of their markings. The flower is more gourd-shaped than in other forms of *C. biflorus*, and the throat is never at all yellow but always pure white. It is a free seeder and crosses easily with *C. chrysanthus*, producing very beautiful forms with sulphur and primrose-yellow ground colour, more or less marked with blue outside. The characteristic black barbed

anthers of *C. chrysanthus* generally appear in these forms, and one of the best was shewn by Messrs. Barr in 1915, obtaining an Award of Merit as *C. chrysanthus* var. *Lemon Queen*.

There remains a range of forms with ground colouring of shades of lilac and almost blue, more pronounced than in the variety *estriatus*, the deepest coloured of the Italian forms. They are the most Eastern forms of this wide-spread species, and have been collected in the Cilician Taurus, Circassia, round Tiflis and even in the mountains of N.W. Persia.

C. Adami of Gay was turned by Herbert into his Variety 2. *Adamicus*, to cover these blue-grounded forms and Baker's combination *C. biflorus* var. *Adami*, is the form now in use.

Being so remarkably variable they will need further sub-division as they become better known, but at present they are very scarce in cultivation.

The lilac form with rich featherings outside figured in t. 3868 of the "Botanical Magazine" from Herbert's drawing is unlike any I have seen in having a white margin to the outer segments.

Messrs. Van Tubergen received a consignment from the Caucasus in 1902 and I saw the collected dried specimens and flowered others here. They varied greatly, but mostly had a buff, more or less feathered, exterior to the outer segments, being otherwise of a rosy-lilac. They are delicate in constitution and the few that I have kept alive have been saved by the protection of a frame. One among them had a thinner tunic and richer purple shades in the flower. In

general appearance they resembled *C. corsicus*, but the rings of the hard, plain tunic show their true affinity.

In 1907 Mr. Barr kindly sent me two corms collected, I believe, in the Cilician Taurus, one of which has increased fairly well and seems to be the second form of *C. Adami* known to Herbert of which he writes "the other is of a bluer tint than any *Crocus* I have seen."

At the time of flowering the leaves are curiously grey and upright and serve to set off the extraordinary blueness of the outside of the flowers a tint nearly approaching real blue. The flowers are so unresponsive to sunlight that they only open on very fine and warm mornings, often remaining tightly closed when varieties of *C. chrysanthus* growing alongside are widely opened. However, they look their best when closed, for the inner segments are of a pale bluish-lavender. So far it has never borne seeds here, doubtless because it so seldom opens, so I know only the one form derived from one collected corm, as the other failed to grow. The unusual colour catches one's eye from a great distance and flowering as it does early in February, it would be a great acquisition to the garden, should it some day become plentiful.

In 1901 I found a self-sown seedling in the rock garden, unlike anything else. It appears to be an extreme form of the variety *Weldenii* with the whole flower tinted with lilac. The segments are bold and rounded, the outer ones nearly covered with purple featherings. There is just a trace of yellow in the throat that may denote a hybrid origin, perhaps a cross with a blue *C. chrysanthus* or *C. aërius*. It

possesses a good constitution. Had it been a wild plant from the Caucasus I should have referred it to *C. Adami*, but think it best, being assured of its garden origin, to call it *Blue biflorus*. Seedlings that I have since raised show distinct traces of *C. aërius* and are very close to the beautiful strain raised by Mr. T. Smith, of Newry, and named by him *C. aërius Celeste*. These, judging by the size of the flowers and the hard coriaceous corm tunic, seem to me to have a good deal of *C. biflorus* var. *Weldenii* in their pedigree.

C. biflorus var. *Barrii* was first noticed by me at a fortnightly show of the Royal Horticultural Society, as an unusually closely feathered form of the white grounded variety *pusillus* with which it was shown. I have grown it here for six years and find it a very remarkable form. The leaves pierce through the ground in tufts and spread out on the surface looking much like clumps of that omnipresent weed *Poa annua*. They are, moreover, of a very bright yellow-green like that grass. It flowers later than other forms of *C. biflorus*, except the albino, and so freely that the flowers actually prevent one another from opening fully. The corm tunic is thinner in texture than that of an ordinary *C. biflorus* and the membrane is mixed with parallel fibre and splits at the base.

C. isauricus is the name attached to a rather variable plant collected in 1907 by Siehe. *Isauria* is the classical name for a country of Galatia with a city called *Isaura* and afterwards *Claudiopolis*. So presumably this *Crocus* comes from the Cilician *Taurus* somewhere near the modern town of *Ermenek*. It may be the



CROCUS CHRYSANTHUS :

Var. E. A. Bowles.

Slightly enlarged.

variety of *C. biflorus* mentioned by Maw as found there by Mrs. Danford.

As I know it in the garden it suggests a close affinity with *C. chrysanthus* in the gourd-shaped flowers with rounded segments ; but it has a few characters that are distinct. The broad anthers generally show a white, central band before dehiscence, and in most specimens there is a slight shading of grey or even black by the edge of the pollen sacs. The leaves are of a remarkably pale grey-green, very similar to those of the strangely blue form of *C. Adami* described above. The flowers have a white ground and a yellow throat and are variously freckled, or finely feathered outside with bluish grey or dull purple. The scarlet stigmata give a pleasant touch of colour to an otherwise rather dowdy flower. Some have a strong scent like heather honey, or *Alyssum maritimum*, in others quite an unpleasant tang is mixed with the scent. A hard coriaceous tunic, with distinct rings at the base, and diphyllous proper spathes are characters common to both *C. biflorus* and *C. chrysanthus* as well as to this plant which, if it reproduces itself truly from seed, may be regarded as a species intermediate between the two older ones.

C. chrysanthus of Herbert was described by him from a dried specimen collected by Fridwaldsky in Greece. It is the most variable species known as to colour, being found with ground colour either sulphur-yellow, orange, white or lilac, while the outer segments show every imaginable degree of freckling, suffusion and feathering of chocolate, brown, grey or

purple, or they may be self-coloured. Some of the white forms with blue markings are difficult to distinguish from small forms of *C. biflorus* and have been confused with it. The most reliable characters are the golden throat of *C. chrysanthus*, together with its rounder, more gourd-shaped flower. Nature has fortunately vouchsafed a special aid to the puzzled gardener in providing black tips to the barbs of the anthers in the greater number of forms of *C. chrysanthus* but withholding them altogether from all forms of *C. biflorus*. These black barbs may be wanting in some specimens and there is a starry-flowered race of *C. chrysanthus* in which the anthers are more or less suffused with a smoky brown, and the flowers striped or freckled with dull grey or brown on the outer segments. Baker placed these as the varieties *fusco-lineatus* and *fusco-tinctus* of *C. chrysanthus*. If their geographical range were limited and isolated, I should feel inclined to regard them as, at any rate, a sub-species, as their shape, fuscous anthers and pale yellow stigmata are such constantly co-related characters. They are the least attractive varieties of this showy species. The other forms may be recognised as *C. chrysanthus* at sight, be they white, blue or yellow, if the black barbs are present on the anthers.

This species occurs in Asia Minor near Smyrna, on the Bithynian Olympus, in Turkey and in Greece. It is very hardy and one of the earliest of flowers in the New Year. Owing to its variability it is also one of the most interesting from which to raise seedlings.

The type as described by Herbert is a rich orange-yellow and of good globular outline, very free flowering, each set of sheathing leaves producing a succession of three, four or more flowers, and three such sets may arise from one strong corm. From the type I have raised forms with yellow ground beautifully feathered outside, one of which has been widely distributed as Yellow Hammer. A larger and more richly feathered form I call Golden Pheasant, which is No. 5, on Plate I. Snow Bunting, and Golden Plover are other striped seedlings raised here, and are growing on into stocks. It will be noticed that I choose the names of birds as far as possible for my seedlings of *C. chrysanthus* and *C. biflorus*.

A yellow form with a purplish grey throat and tube has produced a strain in which the outer segments are more or less suffused with purple or brown. "Bumble-bee" so aptly described one in which, when half open, the yellow inner segments look like the golden bands on the body of a large bumble-bee, that it bears the name of the insect instead of that of a bird.

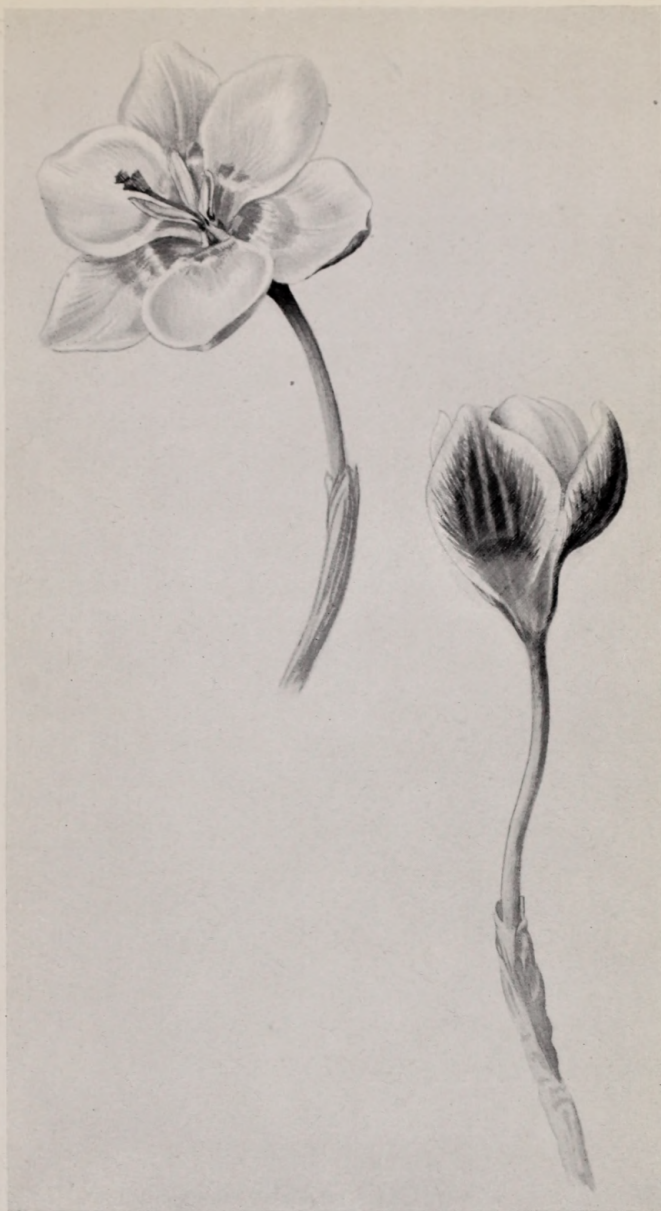
The best seedlings of all were raised by Messrs. Van Tubergen fifteen years ago from a pale sulphur, large-flowered form known as the variety *pallidus*. Many of these are twice as large as ordinary *C. chrysanthus* and very robust. Perhaps the best of them is shown in Plate XVI. I admired it so much when I first saw the blossoms Mr. Hoog sent me from Haarlem that he kindly sent me corms and named it after me. I am very proud of my namesake, although I did not raise it, as it has done so well here, and its butter-

coloured, rounded blooms are singled out from some distance by all who see them as one of the most charming. A set of its sister seedlings generously sent me by their raiser have also done well. If only it would increase more rapidly the handsomest of them is a sulphur with rich purple bands on the outer segments, fig. 3, in Plate I, to be known, by consent of its raiser as John Hoog. Moonlight made her début at a meeting at Vincent Square this spring and was given an Award of Merit. In this the sulphur-yellow fades to a pale cream at the tips of the segments and the massed flowers in the bed have a delightfully pale moonlight effect.

Maw shows a figure of a pure white form with yellow throat and apparently no trace of grey or purple at the base of the segments. I have no form so good as this, but in some the markings are very pale and small, and I still hope for the day when a pure white exterior will be found on a new seedling. White forms with blue featherings or stripes are numerous. Snow Bunting, Lapland Bunting and Silver Pheasant are three of my best. The first is fig. 2 on Plate I, the last has a greater amount of feathering.

Another strain with white ground I raised from a small feathered form that came to me as *C. biflorus nubigenus*. It has conspicuous black barbs on the anthers and so golden a throat that I ought to have guessed that it was a form of *C. chrysanthus* before seeing its seedlings.

They all showed so much yellow on the outside of the outer segments that there was then no doubt, and



CROCUS CHRYSANTHUS BULLFINCH.

when examining Maw's "Herbarium" in the British Museum I found a sheet of specimens labelled "nubigenus," some of which were identical with the one I grew under that name. They came from Chamlijah, above Scutari, and are mentioned in Maw's "Monograph" and two are figured in rather dim colouring in his Plate LIX, b, fig. 3. The enlarged anthers show a slight shading for the black barb, but though one or two show no trace of it, most of his dried specimens have it very strongly developed. Its presence or absence also occurs in my sets of seedlings.

The best of these seedlings is my Bullfinch, a remarkably round flower, creamy-yellow, richly feathered with crimson-purple outside, pure white within but for its orange throat. This is the subject of Plate XVII, but slightly reduced in size.

Siskin is a more pointed flower, bright yellow freckled with grey on the outer segments, a cheery, free-flowering but small form. I hope for a seedling in which the three outer segments will be rich yellow without and the inner segments and all the interior white, but so far none has appeared quite free from the grey basal marking.

Maw seems to have known no form with a blue ground to the interior, his variety *coerulescens* being described as white, marked outside with purple and bluish lilac. Seeds saved from the white forms produce many that should be ranged under this variety *coerulescens*. One of the finest was raised by Mr. Hoog from the variety *pallidus* and gained an Award of Merit when shown in London as Warley Variety. It is a

handsome form, rather like Bullfinch in general colouring, but the flower is longer and there is more blue in its purple suffusion.

It seeds fairly truly, but occasionally gives a sulphur seedling like its parent.

It is possible that the many seedlings now appearing here with a blue-lilac ground colour have a trace of *C. aërius* in them, but the hard tunic, black spotted anthers and early flowering habit show that most of them are best ranged under *C. chrysanthus*. My first blue form and still one of the best, I call Blue Rock. Its outer segments have deep purple shading at the throat on the lilac ground.

Another strain with a blending of yellow and lilac in them, the general effect of which is rather dull and mustardy, I class as *Khaki*. Those of a creamy-yellow shaded at the edge or flushed with rosy-lilac I call *Shot*, and the very pale ones with a wash of cream and lilac on a white ground *Opal*.

These, and a race with pale sulphur or cream ground, plain or freckled with lilac, are the latest breaks in this variable species.

C. aërius of Herbert is a close relative of *C. chrysanthus* and hybridises with it in gardens. Both grow on the Bithynian Olympus, and there is no constant character beyond the much thinner, papery tunic and later flowering habit of *C. aërius* to separate them.

All the wild forms I have seen are blue in ground colour, but though Herbert described his variety *stauricus* as white and lilac inside, he saw dried specimens only, which may have been Maw's variety *coerulescens* of *C. chrysanthus*.



CROCUS AËRIUS MAJOR.

 $\frac{3}{4}$ natural size.

The charm of *C. aërius* lies in the rich crimson or purple markings on the outer segments and its beautifully globular form. It is not a very robust species and has a habit of dying out, but fortunately it seeds freely and its bright red seeds are pleasantly conspicuous and easy to collect even though shed from the capsules. A very fine form known as *C. aërius major* was raised at Newry with flowers twice as large as in the type and beautifully shaded with blue and crimson. It too is not easy to keep, and seedlings vary a good deal. A curious form with yellow ground and brown and grey markings appears among seedlings where *C. chrysanthus* is grown as a neighbour, and generally shows its hybrid origin by having black and brown markings of varying intensity on the barbs of the anthers. Certain greyish and pale lilac forms I believe to be hybrids with *C. biflorus*, the best of them all is the variety *Celeste* that originated at Newry and is mentioned above under *C. biflorus*.

C. cyprius of Boissier and Kotschy is a diminutive species peculiar to Cyprus. It is rather delicate, but so beautiful that it is worth protecting in a frame or under a hand-light. The flowers are a soft lavender, with very rich orange throat and deep purple blotches at the base of the segments externally.

Its distinguishing characters are the bright scarlet of its filaments, a soft membranous tunic that splits into rings without teeth at the base, and a monophyllous proper spathe.

The filament distinguishes it from *C. aërius* and its monophyllous spathe and absence of teeth on the

rings of the tunic from *C. Hartmannianus*, which is a new species described in 1914.

I noticed *C. Hartmannianus* of Holmhoe among collected roots of *C. cyprius* from the Troodos in 1904 and again in 1909, at shows of the Royal Horticultural Society, and have managed to keep the two forms alive in a cold frame. The two individuals I thus obtained vary somewhat in the colouring of their flowers, but both are paler in ground tint than *C. cyprius* and have the purple markings of the outer segments continued further up to the tip.

In the first of these the anthers are tinged with brown at their tips, in the other they are jet black and in both have scarlet filaments like those of *C. cyprius*.

The corm tunic is a stiffish membrane with parallel fibres running throughout its length, and there are two rings at the base with strong fibrous teeth springing from the upper edges, quite unlike those of any other annulate *Crocus*.

Except for those which I grow I do not think that *C. Hartmannianus* is in cultivation; and as it seems more robust than *C. cyprius* it would be worth collecting. It is found on the southern slopes of Kionia in open places in the forest above the Monastery of Makhaeras about 880 metres above sea-level and flowers in mid-February.

Among a few seedlings I have raised one is larger and more robust and looks as though crossed with *C. chrysanthus*.

C. Pestalozzae was described as a species by Boissier,



CROCUS HARTMANNIANUS.

 $\frac{3}{4}$ natural size.

but Maw considered it an albino form of Herbert's *C. biflorus* var. *nubigenus*, on the strength of finding it near Constantinople, mingled with a feathered form similar to that he collected on Chamlijah. I have shown that this last is a form of *C. chrysanthus*, and that Maw did not discover its identity. Whether or no the feathered form from Constantinople and that from Chamlijah are identical, I find it hard to believe that *C. Pestalozzae* is an albino of any other species. I have never seen seedlings revert to a feathered form, and it is very distinct in its thread-like stigmata. Also a blackish stain occurs on the internal lower half of its filaments, the like of which I have seen in no other *Crocus*, and these spots make it look as though three tiny pellets of soil had fallen into the throat. It is the smallest *Crocus* we have in cultivation, pure white with a yellow throat, and a grey mark at the base of the outer segments.

C. Crewei presents the botanical worker with a puzzle that perhaps only the collection of fresh, living material can solve. Sir Joseph Hooker first described a plant under the name in 1875 in the "Botanical Magazine," t. 6168. The figure and description lead one to believe that the basal rings of an annulate *Crocus* were not present, and that the tunic resembled that of *C. laevigatus* in splitting towards the base. The successive layers of tunics shown in the figure are those of at least four successive seasons, and had they been cleared away it is likely that the innermost tunic formed in the previous autumn might have shown basal rings.

The white flowers feathered with purple, and the black anthers are the same as shown in Maw's Plate LX, and both were drawn from plants collected by Mr. H. J. Elwes on the hill behind Syra. Maw noticed and figured the basal rings, as he knew that it was best to remove tunics of all but the last season's growth.

This form with a white ground was grown by Mr. Smith of Newry and I had it from him, but fear it has died out with both of us. Miss Willmott grew it at Warley Place and I hope has it still. The plant generally offered of late years as *C. Crewei* is quite different, more starry in shape and has an internal ground colour that is a clear lilac, and so much like that of *C. reticulatus* that but for the black anthers and annulate tunic of this so-called *C. Crewei*, it would be difficult to distinguish them. I have been unable to find out exactly where it was collected but my original plants were given me from Kew and sent there by Mr. Whittall, of Smyrna.

They grow happily and flower freely in February in the open ground and are very attractive on account of their deep black anthers. I have raised this lilac form quite truly from seed and feel very doubtful about its being a lilac form of the true *C. Crewei*.

C. Tauri as described and figured in Maw's "Monograph," Plate LXI, has never been in cultivation. Many plants have been sent from the East under the name, most of which proved to be forms of *C. reticulatus*. One collected by Egger of Jaffa is the remarkable vinous purple autumnal species described above as *C. dispathaceus*. Another, from Siehe of Mersina, is

the beautiful blue form, I take to be Herbert's blue *C. Adamicus* and yet another was described by Baker as *C. Tauri* var. *melanthorus*, and is so distinct I consider it worthy of specific rank. It is described on page 144. The true *C. Tauri* should have a thin, papery corm tunic splitting into rings at the base, which distinguishes it from all forms of *C. biflorus* in which the tunic is thick and hard. Its very short, pale yellow pistil and long self-lilac flowers distinguish it from *C. aërius*, which closely resembles it in tunic. It was discovered by Aucher-Eloy near the Cilician Gates of the Taurus and it is a pity that so fine a species has not been introduced to cultivation.

C. Danfordiae was described by Maw from specimens gathered by Mrs. Danford at Tapizite in the Anti-Taurus and grown by him at Benthall, near Broseley. Although he describes it as seeding freely I believe it is now lost to cultivation. I never saw living plants and from herbarium specimens am inclined to rank it as a minor form of *C. chrysanthus*, since the anthers have similar black barbs and the shortness of the stigma, selected by Maw as the principal distinction, is not altogether unknown in some forms of *C. chrysanthus*.

XII.

MISCELLANEOUS SPRING FLOWERING CROCUS SPECIES.

THIS chapter contains certain species that do not fit in conveniently with those already grouped, but otherwise have little in common.

Two have more or less semi-cylindrical leaves and are found in Spain, namely *C. carpetanus* and *C. nevadensis*.

C. Fleischeri and *C. parviflorus* are alike in their tunics, which differ from those of any other species in the silky interwoven fibres which resemble those of *Iris Sisyrinchium* more than that of a *Crocus*.

Besides these I have included a few either imperfectly described or not in cultivation.

C. carpetanus of Boissier and Reuter occurs only at high altitudes in a limited area in Spain or Portugal. It is abundant in the Sierra de Guaderrama in Spain, and on the Sierra d'Estrella and near Coimbra in Portugal. It has never been widely cultivated and I regret that it has died out here, after doing well for a few seasons, both in the rock garden and *Crocus* frame. It is a very distinct and curious species as to its leaves, tunic and pistil.

The tunic is thick and soft like a wad of tow, composed of fine, yellowish, netted strands lengthening

out at the summit of the corm into long, silky hairs that form a cap of over an inch in length.

The leaf is semi-cylindrical in cross section, having no trace of the usual blades, but appears to be composed of the keel only with numerous parallel ribs running through the whole length, and minute hairs fringing its two outer edges.

The flowers are rather small, with segments no more than an inch in length. In the forms that I have grown they were of a very delicate shade of lilac with grey-blue veining and some were nearly white in the centre of each segment. Maw found white forms, but like the lilac ones they were veined externally with bluish lines.

The pistil is very remarkable, for the short, nearly entire stigmatic branches are of much the same shade of lilac as the segments. The only other species known with a lilac pistil is *C. iridiflorus*, which is totally different in its distribution and its other principal characters from *C. carpetanus*.

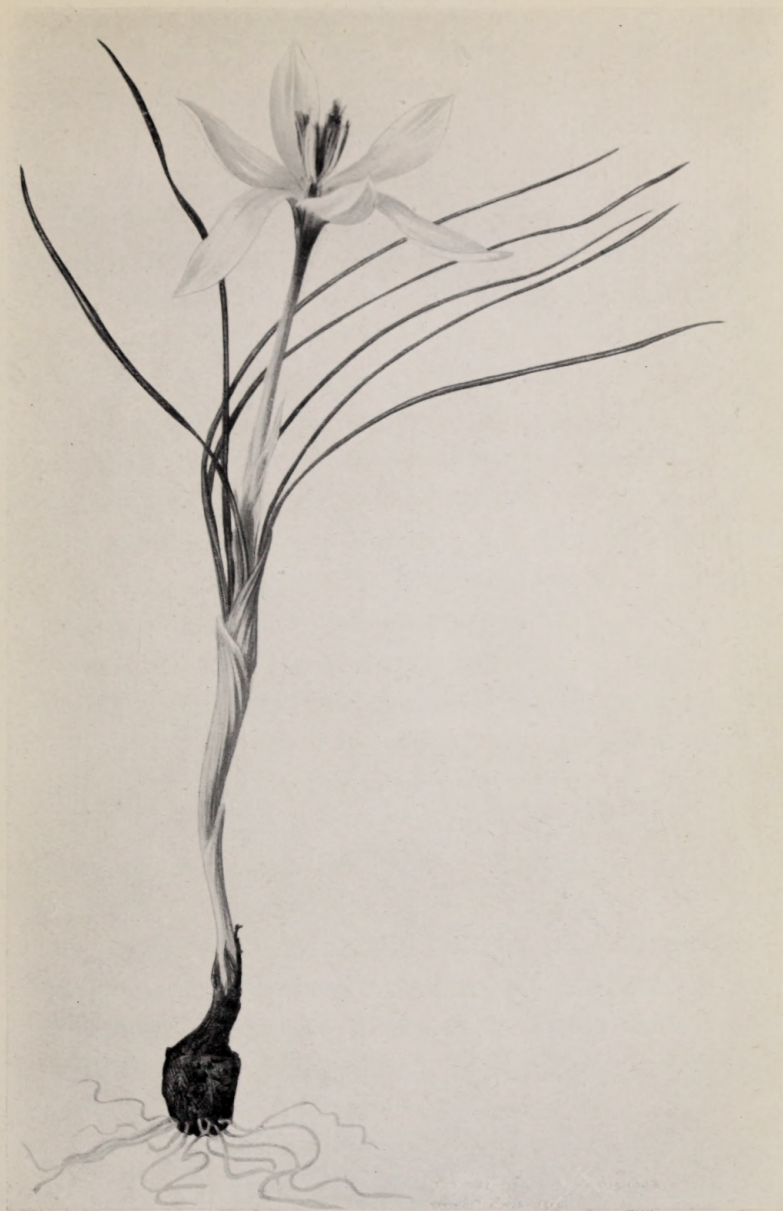
C. nevadensis of Amo and Campo is the same as Pomel's *C. atlanticus* and Baker's *C. algeriensis*. The only species besides *C. Salzmannii* that is found both in Europe and Africa; it occurs in the Sierra Nevada above Granada and on the Sierra de San Cristoval in Spain, and in Algeria near the Moroccan frontier in the province of Oran from Daiza to Garronban. I have only grown the Spanish plant and found it difficult to flower and lost it after a few years. It thrived best in a sandy bed in the rock garden. It is an interesting rather than a beautiful species, for the starry flowers

are very pallid, greenish-yellow in the throat and finely veined with pale lilac on a pinkish-white ground. They are funnel shaped and seldom open out fully, even in strong sunshine. The leaves are much like those of *C. carpetanus* but have a shallow furrow on either side dividing the keel from the blade.

The appearance of leaf and flower suggests some *Romulea* rather than a *Crocus*, and makes one feel that this and the allied *C. carpetanus* stand half-way between those two genera. The stigmata are frilled and white and unlike those of any other species.

C. Fleischeri of Gay can never be mistaken either dormant or when flowering. The tunic is a wonderful piece of natural weaving, its fine strands being so closely interwoven that it seems to be plaited. This character caused Maw to place it and *C. parviflorus* in a section including only those two species which he designated *Intertexti*. Even should the tunic be wanting, the corm of *C. Fleischeri* is so yellow that it is easily recognised.

It pushes up fine, grassy leaves in January and is one of the earlier spring species to flower. The segments are white, and variously striped with purple on the outer segments, they are very narrow for their length, less than a quarter-of-an-inch wide and well over an inch long. The flower is very graceful in outline and more starry than any other *Crocus* when open. The finely divided stigmata are scarlet and very beautiful, and of such a bright colour that they can be seen through the white segments of a closed flower, and remind one of the yolk seen through the



CROCUS FLEISCHERI.

 $\frac{3}{4}$ natural size.

shell of a woodpecker's egg. It grows in Asia Minor round Smyrna and in the Cilician Taurus, and although such a seemingly frail plant is remarkably hardy and easily grown.

C. parviflorus of Baker is only known by the specimens gathered by Mrs. Danford near Anascha in the Cilician Taurus, now in the Kew Herbarium. They have a similarly intertwined tunic to *C. Fleischeri*, but undivided stigmata and minute lilac flowers.

C. alatavicus was described by Dr. Regel of St. Petersburg in 1869. It is found in the Ala Tau Mountains and neighbouring tracts of country in eastern Turkestan, and is the only *Crocus* known from so far to the north and east in Central Asia. In general appearance it looks like a white form of *C. Korolkowii* which is the only other species found east of the Caspian Sea. Their leaves alone would be sufficient to distinguish them however, *C. alatavicus* having a convex ribbed keel and *C. Korolkowii* a concave one. In the latter also the leaves are remarkably more numerous and narrower than in *C. alatavicus*. Both species have diphyllous proper spathes, no basal spathe and entire stigmata, but *C. alatavicus* has a thinner tunic and smaller corms which together with its distinct leaves and white grounded flowers render it specifically distinct from its somewhat similar yellow-flowered neighbour.

Some years ago it promised to be a free flowering and easily grown species, but has almost disappeared from cultivation, and I have only one plant left out of many that I tried in various positions.

The survivor is growing in a rather stiff clay at the foot of my rock garden, and though apparently healthy has neither produced seeds nor any increase of corm.

In lighter soil it died out quickly but has lived for some eight years undisturbed in the clay, perhaps giving us a hint as to its requirements against the time when a fresh importation of its roots may arrive.

The large pointed flowers are white internally with a yellow throat, and vary a good deal as to the external markings. A form with dull buff exterior from meadows near Wernoji was named variety *albus* by Regel and variety *ochroleucus* by Baker. I saw specimens of this in Miss Willmott's garden at Warley Place, but it is not so beautiful as the forms that are freckled or striped with a rich brownish-purple. It flowers in February, and throws up several blossoms in succession from one shoot.

C. Leichtlinii. This curious, greenish-yellow flowered Crocus was described by D. Dewar as a variety of *C. biflorus* in the "Gardeners' Chronicle," vol. IX, p. 235, in 1891, from specimens collected at Mardin in Asia Minor sent by Max Leichtlin to Kew.

Its corm tunic is quite distinct from that of *C. biflorus* as it splits downwards and upwards into pointed strips, and there are no rings of tunic towards the base such as are the chief distinguishing feature of *C. biflorus* and the other annulate species.

The vandyked, incurving lower portion of the tunic is somewhat like that of *C. laevigatus* but is not so hard nor so dark in colour. The tunic of *C. Crewei* as shown in Fitch's drawing in t. 6168 of the "Botanical

Magazine " is rather like that of this species from Mardin, as to the upper teeth, but the lower strips are square at their tips as drawn by Fitch, but sharply pointed in the so-called *C. Leichtlinii*.

The upper points bend outwards round the base of the sheathing scales, and the lower points curve inwards fitting the base of the corm and allowing the roots to escape through the slits. There is also an inner tunic of thinner texture split upwards into shorter points than those of the outer tunic, but it only reaches downwards for about a third of the corm and ends in a straight, very slightly split, edge. The basal tunic is very small, a coriaceous disc with a fringed edge. The leaves are narrow, about six in number.

There is no basal spathe and the proper spathes are diphyllous. The flowers are small, the segments an inch long and a third-of-an-inch wide, the three outer yellowish externally with a band of slatey-grey up the centre; the inner segments are paler with a greenish-blue spot at their bases. The throat is orange, unbearded, and the yellow anthers are marked with greenish-grey stripes up the centre of both faces, and are twice as long as the yellow glabrous filaments. The stigmata are scarlet slightly toothed, and reach only a little way above the bases of the anthers. It flowers early in February and is fragrant but has a strange faded or washed-out appearance, being of such pale shades of yellow and greyish-lilac, with a curious tint of green throughout.

It has seeded with Mr. Peter Barr and the seedlings are exactly like the wild collected form. Such a distinct plant deserves specific rank.

C. Tauri melanthorus mentioned by the late Mr. James Allen in the "Gardeners' Chronicle," vol. XIII, p. 226, 1893, is another imperfectly described plant. It was sent by Mr. Whittall from Smyrna, and has the tunic of an annulate species, such as *C. biflorus*, of hard coriaceous substance, not a thin membrane as in *C. Tauri* proper.

It bears very small, remarkably globose lilac flowers in February. The outer segments, less than an inch in length, have a dark reddish-purple band up their centres externally. The orange in the throat shows through to the outside where the base of the segments is almost red, but not so bright as in Moon's drawing in which it is No. 1 on the plate facing page 104 of "Flora and Sylva," vol. II, 1904. The stigmata are scarlet, entire and longer than the deep black, curiously hastate anthers.

It is an attractive species although so small in all its parts, as the black anthers and scarlet stigmata give the flower a peculiar charm. It increases slowly by division and has not yet borne seeds, so that it is still a very scarce plant.

A few other imperfectly known species deserve mention :—

C. lazicus of Boissier discovered by Mr. Balansa in 1866 in moist meadows above Djimel, south-east of Trebizond in Lazistan, is only known from the dried specimens then gathered. It is uncertain whether it was flowering in June or August and is remarkable for the very curious characteristic that the sheathing scales are shorter than the basal spathe. It bears



CROCUS LEICHTLINII.

 $\frac{3}{4}$ natural size.

a fine yellow flower and increases by underground stolons after the manner of *C. nudiflorus* and *C. gargaricus*, and would be a very desirable addition to cultivated species.

C. Bilottii of Maw, Plate LVib, *Mon. Croc.*, also grows near Trebizond and was found near Stauros flowering in May. Maw cultivated it, but it has since been lost.

It has much the appearance of *C. aërius* but differs in the tunic which splits downwards into loose fibres and is without rings at the base, and also in having a basal spathe.

C. Boissieri of Maw, Plate XX, *Mon. Croc.*, is only known from an imperfect specimen gathered near Konghoz in Cilicia. It appears to be rather like a white form of *C. vernus*, but has very narrow segments and filaments twice as long as the anthers.

C. montenegrinus of Kerner, was found by Herr Maly on Mount Orgin, in Montenegro. The specimens he dried have very peculiar stigmatic growths attached to the tips of the anthers, that look like an abnormal outgrowth, but as Kerner at first labelled the specimens as *C. appendiculatus* and afterwards changed the name, it looks as though all those gathered were alike. Maw's Plate XXIII in his "Monograph" shows the throat as yellow, and the stigma as divided at the level of the throat into long, narrow entire branches. But for these three characters it closely approaches *C. vernus*. The late Oskar Bierbach collected some corms for me from the locality where *C. montenegrinus* was found, but they are a small form of *C. vernus*,

with white or lilac-veined flowers, very much like the variety *siculus*.

C. Mouradi from Mourad-dagh, Smyrna, is described in "The Garden," vol. XXXV, p. 473, 1889, as being intermediate between *C. chrysanthus* and *C. aureus*, with bright orange flowers and pale yellow anthers and stigmata. I have not seen specimens.

C. Jessoppiae is a name I have attached provisionally to a remarkable though small species that appeared among some seedlings and off-sets I gave to my neighbour Miss Jessopp.

The flowers are somewhat similar to those of *C. Pestalozzae*, but are larger with stronger blue markings at the base of the outer segments.

Its most distinct character is the curiously coarse parallel fibres of the corm tunic which are like those of *C. candidus*, but its narrow leaves and undivided stigmata distinguish it from that species. I think it must be a hybrid and that its parents were some white form of *C. chrysanthus*, and either *C. candidus* or some species with a strongly netted corm tunic.

It flowers remarkably freely early in March and has increased well, but has produced no seed.

XIII.

NOTES ON A BIBLIOGRAPHY OF THE CROCUS.

A VERY long list might be made of books dealing with the Crocus, but only the more important and interesting among them are mentioned here, arranged according to their dates of publication.

1597. *John Gerard. The Herball, or Generall Historie of Plantes.*

He describes *C. sativus* only, and gives two good figures, one showing the leaves, the second with leaves and flowers. The other figures which he calls *Crocus Vernus* represent two *Romuleas*.

Thomas Johnson in the revised edition of 1633 adds eleven figures from Clusius' "*Rariorum Plantarum Historia*" to those of *C. sativus*, and the others of *Romulea*. This later edition is much more generally known than the rarer work of Gerard himself, and Maw does not appear to have seen the earlier one. He is therefore wrong in stating that Gerard described eleven forms.

1601. *Clusius. Rariorum Plantarum Historia.*

The eleven figures, afterwards used by Johnson and other writers, first appeared in this work. Most of them represent forms of *C. vernus*, one is *C. aureus*,

and two *C. susianus*. The second of these shows a semi-double variety and has been often copied to illustrate other books, as for instance in Passaeus' "Hortus Floridus" of 1614. Clusius's first figure of *Crocum montanum* looks like *C. asturicus*.

1614. *Passaeus. Crispin de Pas. Hortus Floridus.*

Contains some of the most beautiful engravings of flowers ever produced. Those of *CC. vernus, sativus* and *nudiflorus* are very good portraits.

1629. *Parkinson. Paradisi in Sole Paradisus Terrestris.*

Parkinson describes twenty-seven forms as Crocuses, but one (fig. 9) is a *Romulea*. This book is of special interest as showing how many forms of *Crocus* were then cultivated in England and that *C. aureus* had already produced several varieties.

1671. *Hertodt. Crocologia.*

This curious little book mostly deals with the medical uses of Saffron, but describes twenty forms, many of which can be recognised. For further information see page 61 of Chapter VI.

1753. *Linnaeus. Species Plantarum.*

It is worth noting that this great botanist could have had but little knowledge of living Crocuses. Thus he classes the Saffron Crocus, as the variety *officinalis*, and all vernal Crocuses as the variety *vernus*, of his species, *Crocus sativus*. His second species moreover is most likely *Romulea Bulbocodium*.

1768. *Miller. The Gardener's Dictionary.*

This is the eighth edition of this great work and the one accepted as authoritative being the first edition arranged according to the Linnaean system. He enumerates twelve varieties of spring and four of autumn Crocuses. His description of *C. biflorus* is the accepted first description. The account of the cultivation of Saffron is of great interest.

1809. *Haworth. A Paper in the "Transactions of the Horticultural Society of London,"* vol. I, describes thirteen forms and is accompanied by a good figure of *C. stellaris*.

Haworth divided his species into two groups—*Piligeri*, with bearded throats, and *Depilati*, those with hairless throats.

1826. *Tenore* described and figured four Italian species, including *C. Imperati* which still stands under the name given by him. He also described these in his "*Flora Napolitana*" of 1836.

1827. *J. Gay* published a review of previous writers' descriptions and later, in 1831, his "*Nouvelles espèces de Crocus*" describing eight species for the first time. Both publications form part of Ferussac's "*Bulletin Sci. Nat.*"

Gay also had some very beautiful drawings of Crocuses made by various French artists, which are now in the Kew Library. They are worthy of study by all who can appreciate the beauty of the drawings or of a *Crocus*.

1827. *J. Bellenden Ker. Iridearum Genera.*

This work contains descriptions of fifteen Crocuses, and is useful in bringing together those of earlier writers. He also described many of the Crocuses figured in the early numbers of the "Botanical Magazine."

1830. *Joseph Sabine* published a paper in the "Transactions of the Horticultural Society of London," vol. VII. A well coloured plate accompanying the text shows nineteen varieties, and a great number of others grown in the Society's garden are described.

1841-47. *William Herbert*, Dean of Manchester.

This skilled botanist commenced his *Crocorum Synopsis* in the "Botanical Magazine" for 1841 and contributed many drawings and descriptions to later volumes and also to the "Botanical Register" until the time of his death in 1846. His most important work *A History of the Species of Crocus* was published in vol. II of the "Journal of the Horticultural Society of London," 1847. The manuscript, almost finished by the Dean a few days before his death, was placed at the disposal of the Society by his executors. It is a masterly work and the foundation of all later classifications of the Genus. The author travelled in eastern Europe and collected plants himself, and was wonderfully successful in obtaining so many new forms, considering the difficulties of transport in his day.

1873. In this year *Mr. J. G. Baker* published his *Review of the species Crocus* in the "Gardeners'

Chronicle." In its final form it is included in that author's *Handbook of the Irideae*, published in 1892.

Sixty-six species are described and the great value of the work lies in its concise form and citation of figures. The classification is based on the extent of division of the style-branches, which too frequently brings together species differing widely in other characters.

1886 is the date of publication of the magnificent "Monograph of the Genus *Crocus*," that Mr. George Maw spent eight years in preparing.

Unhappily it appeared after his sad affliction had occasioned his retirement into the seclusion which only ended with his death in 1912. It is one of the finest Monographs ever produced, both as regards the accuracy of the information and the beautiful coloured plates it contains. Were it but up to date as to recently collected and garden-raised forms, and less costly there would be no need of this handbook. I gladly take this opportunity of stating that most of my knowledge of the *Crocus* family and much of my enjoyment in its cultivation are due to the labours of George Maw as recorded in the pages of his book.

XIV.

COLCHICUMS.

COLCHICUMS present difficult problems to both gardener and botanist. The greater number of the handsome members of the family are easily grown, and the chief trouble in a garden arises from the amount of space required in spring and early summer for their coarse leaves. In autumn the rosy lilac, white or tessellated flowers can never be too numerous, come where they may; but in spring it is almost annoying to watch the unfolding of those great leaves. They expand enormously with the April showers, rise up rapidly on tall shoots and are then ready to fall outwards and sprawl over neater growing plants that one realises too late have been planted too near the Colchicums. They would make a good edging to beds of shrubs or tall herbaceous plants, but for their aggravating habit of beginning to fade and collapse in the first warm days of June. It is bad for the plants to clear away the flabby yellowing leaves, and it is only the truly hopeful-hearted gardener that can find any pleasure in watching their decay, by looking forward to the crop of flowers promised by so much ripening foliage.

For the botanist their evil ways are numerous indeed. In most of them the colour of both the styles

and the filaments changes gradually from white to purple according to the age of the flower. The skin of the anthers, which may be yellow or purple before splitting, provides a clue to the identity of a few species, but after the pollen has escaped it is hard, especially in dried specimens, to distinguish the original colour of an anther, and this has no doubt caused various authors to disagree in their descriptions. The absence of leaves at the flowering time of so many species is another source of trouble, for it is a difficult matter to gather plants from their native homes at two seasons and yet be certain that leaves and flowers came from the same plant.

This difficulty has caused an error in the fine figure of *C. Sibthorpii* (there named *C. latifolium*) in Sibthorpe's magnificent "*Flora Graeca*." The flower represents *C. Sibthorpii* of Baker, but the leaves are those of *C. byzantinum*.

Any *Colchicum* flower that has been dried for more than a year is generally of a singularly dull shade of buff, with an occasional flush of lilac at the tips of the segments. The chequered markings of certain species may disappear entirely in some dried specimens, especially in fully matured blossoms. Now and then a species described as without tessellation bears flowers that are strongly chequered at their first opening and the markings fade away in a day or two.

Botanists may then be forgiven, if we find difficulty in recognising living plants from their descriptions, for there can scarcely be a family of plants that is harder to describe and classify.

I can only attempt to guide my readers among the intricacies of those forms which I have been able to grow.

The Genus *Colchicum* belongs to the Lily family and differs from *Crocus* in three main characters, the position of the ovary, and the number of the stamens and also of the styles. Superficially there is such a general likeness in the flowers of the two that the misleading names of Meadow Saffron and Autumn *Crocus* have been used for the *Colchicum*.

In both genera the ovary is hidden below the ground at flowering time, and the flower is raised on a long perianth tube instead of a stalk.

In *Liliaceae* the ovary is superior, that is to say, *inside* the perianth tube or the perianth segments, and there are six stamens. These characters are found in a *Colchicum*, contrasting with the three stamens and the ovary *below* the perianth tube, of a *Crocus*.

Also a *Colchicum* has three distinct styles arising from the top of the ovary. Though in some species they are joined for a little space about half-way up the tube, they end in three simple stigmatic tips. In a *Crocus* there is only one style which is divided into three branches near its summit.

The presence of the six stamens is sufficient in itself to distinguish a *Colchicum* from a *Crocus*.

The dormant period of a *Colchicum* is short. The leaves fade after the ripening of the seed in June, and the corm matures soon after. Those that flower in autumn are ready in August to form new roots and push out flowers. Some species can flower satis-

factorily at their natural season without being planted or supplied with any moisture. I have seen a gay show of flowering Colchicums in cottage windows in Cornwall provided by corms laid in a row on the ledge of the bay window.

It is very unusual that a plant brings flowers to perfection without active roots to supply moisture to the expanding cells. *Sauromatum guttatum*, a large Aroid, has been much advertised as capable of flowering in a dry state. The Aroid produces only one blossom, but *C. byzantinum* can bear twelve to twenty in a long succession and without active roots. Gathered flowers of many species will last fresh for several days without being placed in water.

As in the case of a *Crocus* the dry, resting state of a Colchicum is a corm, a solid underground stem, in which nutriment is stored.

In many species, especially in *C. speciosum* and *C. byzantinum*, the corm is very large, four inches or more in length and about two inches in diameter in the widest part. One of these large corms will repay examination and explain the manner of growth.

It is irregular in shape, one side being convex and the other flattened and prolonged downwards to form a curious foot-like projection, which is a characteristic feature of most species of Colchicum. If the tunic is removed the large white corm is seen to have an upper projection, more pointed than the foot and also on the flattened side. A central groove runs down longitudinally on this side, widening towards the base of the foot. The new growth for the coming

season is formed in the hollow found at the base of this groove. In a fully grown but unripened corm examined in mid-June this growth bud is very small and looks much like the tiny radicle seen between the two halves of a walnut or filbert kernel. It grows with astonishing rapidity as soon as the corm is ripened. A second, similar bud is generally formed on the surface of the convex side, but at a point about half-way up, instead of at the base.

The tunic, a white, fleshy skin at first, is brown and leathery when mature and composed of the lower portion of the outermost leaf, and completely wraps the whole corm. This outer tunic and the dried bases of the other leaves are produced upwards into a long, tough cap that reaches up to the surface of the ground. It appears to assist the emergence of the tender buds by keeping a free passage through which they can push their way.

All the roots spring from a definite area at the base of the new shoot and if a corm is examined in early summer, while the leaves are still green, it will be seen that the foot of the new corm is formed from the side adjacent to the old corm, and the roots of the previous season grow from the outer side.

The leaves vary in the different species from narrow, tongue-shaped, almost linear blades, from a quarter to half-an-inch in width, as in *C. alpinum*, to those of *C. byzantinum*, which are five to six inches wide and a foot long, ribbed longitudinally and so much resembling those of a *Veratrum* that this species has been called *C. veratrifolium* in gardens.

As the leaves mature in the end of May, the large seed capsules are revealed in the cup formed by the bases of the two or three innermost leaves.

The seed vessel is formed of three distinct carpels, free in their upper half but generally united below. When ripe they open at the summit and the round, thick-coated seeds escape.

All parts of the common Colchicum, *C. autumnale*, contain an active principle called Colchicin, but the chemists who have investigated it are not agreed as to its properties.

It was known to the ancients as a dangerous poison, but the corms of other species of Colchicum of eastern origin enjoyed great reputation in medicine under the name of *Hermodactylus*.

Theophrastus called it *Ephemeron*, a name that was supposed by some to signify that the poison killed in a day. The passage describing its effect is somewhat confused, probably from a defective text, and it is not easy to follow his reasoning. He relates that slaves often partook of it when provoked, because there was a well-known antidote for it, and also the death from Colchicum poisoning was slow and lingering, sometimes being delayed for so long as a year, though at times death ensued at once. This seems to imply that the death within a day was not the usual effect, and an offended slave made himself ill by a poison that generally allowed time for recourse to its antidote if circumstances improved.

Dioscorides described the plant and its poisonous qualities. Tragus in 1552 warned his readers against

its use in gout for which it was recommended by the Arabians. Lyte in his translation of Dodonaeus in 1578 writes "Meadow or wilde Saffron is corrupt and venomous, therefore not used in medicine," but Hermodactyl he describes as very good for the "gowte, the sciatica and all paynes of the joyntes."

Though Colchicum was mentioned in the London Pharmacopœia of 1618, it was not much valued as a medicine until about the end of the eighteenth century. Then Baron Storck of Vienna called attention to it as a remedy for gout, and it is now recognised as a valuable medicine. Its power of easing pain is said to be due to its effect in checking the circulation, but it is well known that a too frequent use has a terribly lowering effect on the patient. It is interesting to notice how its medicinal reputation has increased while that of Saffron has dwindled and disappeared during the last century.

The name Colchicum is derived from Colchis in Asia Minor where the genus is commonly distributed.

It is known in some parts of England as Naked Boys, because the flowers appear without leaves. Parkinson wrote "Some have also called them Filius ante Patrem, the Sonne before the Father, because (as they think) it giveth seed before the flower." He then proceeds to show that this is untrue as it flowers in autumn before the leaves appear and the seeds follow with them in spring.

The large flowered species that blossom early in autumn are easily grown, and so are a few of the spring flowering forms. Those that blossom in mid-winter,

like *C. variegatum*, are not easily kept in health, and most forms of *C. montanum*, and some other beautiful spring-flowering kinds, are very difficult to keep alive in the open.

C. speciosum and its varieties, are among the handsomest of bulbous plants and should be in every garden where room can be spared for the leaves in spring. A rich, deep, and rather moist soil suits most of the species best, but they will thrive in well-drained slopes of the rock garden also.

CC. autumnale, *byzantinum*, *agrippinum*, *laetum* and *speciosum* do well in grass, but in view of their poisonous nature it is not wise to plant them where cattle graze, and the seed-pods and leaves should be gathered out if the grass is to be used for hay.

However, after making many enquiries I have been unable to learn of a definite case of cattle poisoning from *Colchicum*, and it seems probable that beasts avoid eating it just as they shun buttercups. *Colchicums* are so plentiful in some parts of Gloucestershire and also in Alpine pastures, that if beasts ate them cases of poisoning would surely be frequent. I have lately seen meadows in the Vésubie Valley, in the Maritime Alps, that were full of *Colchicums*, and the leaves and seed-pods were being cut and dried in the hay. They were so numerous that it is evident the peasants are not afraid of their poisoning their cattle. It may be that, as with the leaves of *Narcissus*, which are regularly gathered and stacked and fed to cows in the Isles of Scilly, the poisonous qualities disappear with drying.

When planted in grass increase is slow, and as with Crocuses, if it is desired to obtain a stock, the roots should be planted in well tilled ground and divided every second year. In a wild state the corms of most of the species are found at a great depth, but in garden ground they do best with the cap of the tunic reaching the surface.

XV.

COLCHICUM AUTUMNALE AND ITS ALLIES.

IF we take our wild *Colchicum* as the starting point of this group of self-coloured flowers we shall find only minor characters to help in distinguishing some of the nearly related ones. All of them are worth growing for their free-flowering habits and to provide a succession of bloom from September to December.

C. autumnale of Linnaeus has rather starry flowers about two inches in length, of a uniform, soft, rose-lilac in the ordinary form. The styles are white and are curved at their summits into crooks which are covered with small papillae, forming the stigmatic surface for the reception of pollen. I have received wild forms from Wiltshire and Norfolk showing slight traces of tessellation in young flowers.

Variety *album* has white flowers, rather smaller than those of the type but so freely produced that it makes a charming plant both in the garden and in grass, flowering later than the rosy form.

Variety *striatum* is more curious than beautiful, with irregularly striped pink and white flowers.

Variety *atropurpureum* is a very beautiful form found in France in the Valley of the Meuse. It has been re-introduced recently by Mr. Van Tubergen of Haarlem, but was known to Parkinson who accurately

described it in the "Paradisus" as pale purple at first, "but after it hath stood in flower two or three dayes, it beginneth to change and will after a while become to bee of a very deepe reddish-purple colour, as also the little foot-stalk on which it doth stand." In this last stage it is of a claret shade of crimson, deeper in colour than any other Colchicum, and very attractive although it is dwarfer than other forms of *C. autumnale*.

Variety *album plenum* is an old and very beautiful variety. There is an inferior form in which the flowers are neither so double nor so white as in the better. It should show twenty or more long, narrow, white segments, with just the faintest imaginable flush of pink in their heart. As with other double flowers, the blossoms retain their freshness and beauty longer than single flowers. When flowering well this good old garden plant is very ornamental in September and October. It is unfortunately rather scarce and always maintains a high price for a Colchicum.

Variety *flore pleno*, has double lilac flowers, but an unfortunate habit of blossoming so late in the year that, in most seasons, the cold weather destroys much of its beauty. Should it appear after a spell of sharp frost the flowers are often striped or pied, and at times half lilac and half of a poor, yellowish white.

A plant grown in gardens as *C. Balansae* seems to be the same as *C. autumnale minor*. It has numerous pale, rosy lilac flowers, with more rounded segments of better substance than those of the wild type. Halacsy's description of *C. parnassicum* suggests this plant.

The variety *algeriense* was described as a species at first by Battandier and Trabut in their "Flore de l'Algérie," but in their later work, the "Flore Analytique," it is placed as a variety of *C. autumnale*.

It differs from the type in having purple or black anthers and the throat of the flower so much deeper in colour that it is of a rich purple. I think this plant is grown in the Cambridge Botanic Garden, but I have not heard of it elsewhere.

C. laetum of Stevens is widely spread in the Taurus Mountains, the Caucasus, Asia Minor, Syria and Persia, and differs from *C. autumnale* chiefly in its longer and narrower segments which should be glabrous at the base within. I believe that I grow the true plant and can recommend it as being very floriferous and possessing no fads, doing well in partial shade or full exposure.

C. candidum from Cilicia is either the same or closely related.

C. Decaisnei of Boissier, from Lebanon, seems to differ from *C. laetum* chiefly in the greater length of its styles and a downy throat. As I know it in the garden it flowers rather later in October and bears paler flowers.

C. lingulatum of Boissier found on Mount Parnes, in Greece, has very long, narrow segments and seems to agree with a starry-flowered species I received from a friend in Salonica during the war.

C. Troodi of Kotschy from near Pedoulus in the Troodos Range, in Cyprus, is a small flowered species only recently arrived here. It has lilac flowers of no

great beauty, but small, neat leaves for a *Colchicum* that may qualify it for a choice position.

C. alpinum of de Candolle is one of the most delicately beautiful of autumnal bulbous plants. It is very plentiful in the Alps especially on Mont Cenis, at le Lautaret and in Italy, Sicily and Switzerland, but is very seldom seen in cultivation. First of the genus to flower, often appearing in the first days of August, its flowers are about an inch in length and of a uniform rosy lilac.

They are followed in spring, after the melting of the snow, by two narrow leaves, that if once recognised as belonging to this desirable species are an easy guide to its corm. Fortunately it does not grow so troublesomely deep in the soil as is the habit of its relatives. I have not found it very easy to grow, and perhaps there is something lacking in our conditions that fails to compensate it for the long resting period under the snow of its alpine home. It is worth looking out for when collecting in the Alps, and trying in various soils and positions at home until success is assured.

C. gadarramense of Pau is the name applied at Kew to a charming little species that came to me some years ago from the mountains of Asturias in northern Spain. It greatly resembles *C. alpinum* but flowers in September quite a month later, is rather larger in flower and a great deal larger as to its more numerous leaves.

The stiff, solid little segments of the flowers are of a charmingly warm shade of pink, and the plant promises to be quite at home in the lower beds of the



COLCHICUM ALPINUM.

rock garden. Willkomm and Lange mention a plant in their "Flora Hispanica" found near Guadarrama, as being akin to *C. arenarium* a Hungarian species not in cultivation. Possibly it is this Spanish species which was at that time very imperfectly known to them.

C. corsicum of Baker is much like *C. alpinum*, but differs in longer stigmata and larger corms and seed-pods. It is peculiar to silicious soils in the mountains of Corsica and is not in cultivation.

C. neapolitanum of Tenore is found in parts of southern France as well as in Italy. It is a small flowered species, very much like *C. autumnale*, but is distinct in that the anthers are all inserted at the same level, whereas in most other *Colchicums* they are set in two ranks.

C. byzantinum was so named in Parkinson's "Theatrum," but its first botanical description is that of Ker in the "Botanical Magazine" for 1807. It can be distinguished from *C. autumnale* in all stages, yet it is best placed in this group.

Its crimson stigmata topping the white styles, and strongly keeled perianth segments separate the flowers from those of *C. autumnale* in which the stigmata are white and the segments without keels. The corm of *C. byzantinum* is the largest of the family and so irregular in shape that it has been likened to a doubled fist. The leaves are on a scale to match the corm, sometimes six inches in width and a foot in length and are more strongly ribbed or pleated than in other species. When half grown they look much like those

of a *Veratrum*. Nurserymen's lists sometimes contain a *Colchicum veratrifolium* which is really this handsome plant.

A form with variegated leaves was grown at one time but I have not seen it lately. The variation consisted of a whitish margin, but was not sufficiently well defined to be handsome. *C. byzantinum* grows wild in Transylvania and, as its name tells us, round Constantinople, the ancient Byzantium.

It is one of the most floriferous species, producing as many as twenty flowers from one flowering shoot. Their segments are about two inches in length, rounded and a clear rose-lilac in colour. There is no hardier or more easily grown species and were it not for the immensity of its foliage it should be planted by hundreds to provide a rosy carpet of flowers in September and October.

C. cilicicum appears to be the Cilician form of *C. byzantinum* and is a handsomer plant with larger, more regularly shaped flowers, and happily equally floriferous.

XVI.

COLCHICUM SPECIOSUM AND ITS VARIETIES.

C. SPECIOSUM bears the largest and handsomest flowers of the genus. They stand up boldly on their perianth tubes, which, when fully developed, reach nearly a foot in length. Some four or more inches of the tube are below ground, according to the depth of planting. Allowing for that the flowers are taller than those of other Colchicums and resemble Tulips in appearance.

Their form is globose tapering gradually to the tube and the rounded segments are about four inches in length and in the best forms nearly three in width. As many as four flowers are sometimes produced by each flowering shoot, and such a free-flowering, handsome plant makes a good show in the garden in late September and through the early half of October.

The typical form came first from the Caucasus, but various forms are now known, from Macedonia and as far to the east as Persia.

It seeds freely in gardens and the seedlings vary in size and colour and there are already too many names applied to somewhat similar varieties. This is almost certain to happen when a handsome plant begins to vary in different gardens, and when once a name has found a place in a trade list it is seldom dislodged. The result is that there will be as many names as purchasers will pay for.

The original plant can be distinguished by the deep lilac colour of the tube and the white markings of its throat. On their first appearance above ground the tubes may be cream colour, flushed with lilac, but they deepen to crimson with age. The white of the throat passes gradually into the lilac, but a distinct white point runs up the centre of each segment for about an inch beyond the highest point of the white on the margins. A curious scent can be noticed in this old form, rather like that of a ripe plum, but with a whiff of something unpleasant underlying it, slightly ammoniacal and like that of a stable.

The variety *rubrum* has other names in catalogues all signifying the splendour of its ruby dyes. It first appeared among other seedlings in Backhouse's Nursery at York. The colour is magnificent, glowing like a garnet in the light of sunset.

The pure white variety, *C. speciosum album*, is one of the most beautiful of hardy bulbous plants. The snow-white goblets of good form, equal to that of a Tulip, standing on soft emerald-green tubes cannot be equalled for beauty in the late autumn by any other plant so easy to grow well in the open. Its only rivals among white flowers are *Romneya Coulteri* and *Crinum Powellii album*, which, however, have generally left the field clear for the *Colchicum* before its flowering season commences.

Like the red variety this was a seedling raised at York. The first roots that were sold changed hands at the price of five guineas each.

It requires a little more attention here than the

ordinary forms and I find it best to replant the corms every second year. At Earlham Hall, Norwich, it thrives so well that six roots increased to five hundred in about ten years.

C. Bornmulleri seems to me no more than a gigantic and early flowering form of *C. speciosum*. There may be two forms of it offered by different nurseries. That which came here first under the name can be easily recognised by the flowers being white when they first push through the ground. After a day or two they are mottled and striped with lilac, and when mature are of about the same shade as the typical form of *C. speciosum*.

Their tubes are green and never become tinted with lilac. Another distinguishing feature is found in the appearance above ground of the tips of leaves and spathes before the flowers have faded.

The second form I cannot distinguish from that sent out by some nurserymen as the variety *giganteum*. Both forms differ from *C. speciosum* itself in their green tube and the way in which the white marking of the throat rises higher at the margins of each segment than in the centre.

A variety called *maximum* shows no white in the throat unless the segments are forcibly bent back. Then a narrow white stripe may be seen in the centre only of each segment.

The scent of these large forms is sweeter than that of the type and reminds me of *Alyssum maritimum* and heather honey.

Some nurseries supply as *giganteum* a form which

is distinct in shape. All other varieties of *C. speciosum* can be described as shaped like a Tulip. This plant is not so globular, the segments open out more fully, and remain expanded at an angle of forty-five degrees. They also show a tendency to be twisted which is a never failing guide to their identity. They therefore resemble a Lily rather than a Tulip.

Some roots sent by Mr. Barr from Macedonia were identical with this form, and I take it to be the variety which Baker refers to as *C. illyricum* of Frivaldsky. It would be better that it should be known as *C. speciosum* var. *illyricum*, to show its origin.

It is a very distinct and beautiful plant, remarkably free flowering and rather later than the others of this group.

All varieties of *C. speciosum* are good for indoor decoration and when gathered will last for nearly a week in a bowl, either with or without water. They are particularly beautiful by artificial light which enhances the red tints of the blossoms.

XVII.

TESSELLATED SPECIES.

SEVERAL species bear flowers with the lilac coloration more or less broken up into small square patches, alternating with equal-sized spaces in which the colour is more or less absent.

It is most marked in *C. variegatum*, also known as *C. Parkinsonii* from the realistic woodcut in Parkinson's "Paradisus."

The chequers in this flower are deep crimson and almost pure white. In other forms the markings vary somewhat according to the age of the flowers, and in some, such as *C. Tenorei*, they are only distinct in a young blossom.

One species, *C. Sibthorpii*, stands out from the rest on account of its great size, having segments two inches in length and handsome globular flowers.

C. Sibthorpii of Baker is beautifully figured as *C. latifolium* in t. 350 of Sibthorpe's "Flora Graeca," but unfortunately the leaves were drawn from *C. byzantinum* which has the widest leaves of all. Therefore Baker considered it best to drop the name *latifolium* and to name it after Sibthorpe.

It grows in Greece and the islands off the coast, and I have a particularly hardy and early flowering form that was collected in the hills behind Salonica. Earlier

importations of the plant proved difficult to grow and seldom appeared above ground before the end of November, evidently missing the sunshine of Greece. The Salonica form commences to flower in October and has borne seed here, which I always think a sign that a plant is settling down to our climate.

The flowers, several to a corm, are of good shape, globular, with pointed-tipped segments about two inches in length.

They vary a good deal in the intensity of the dark squares, and are not evenly chequered all over. The general colour of ground and chequers deepens with the age of the flower. The leaves are very distinct at their first appearance in spring and for some time after, and would be sufficient alone to ensure recognition of the species. They have sharply pointed tips and lie on the ground until the seed vessel is pushed up in May. Their most distinct feature is the way they twist, forming a rosette with curved points.

Halacsy in his "Flora Graeca" makes *C. euboicum* of Orphanides a variety of this, with a smaller and generally solitary flower. It was found on Mount Kandyli in Euboea.

C. variegatum of Linnaeus is the correct name for *C. Parkinsonii* of gardens and the subject of t. 6090 of the "Botanical Magazine."

It has been confused with the more easily grown and commoner species *C. agrippinum*, but can be easily distinguished when in flower by the much more distinct chequering of the flowers, the gradual narrowing of the segments to a sharp point, and the



COLCHICUM SIBTHORPII.

absence of any orange spot at the base of the filaments.

When the leaves of the two are compared it will be seen that *C. variegatum* as Linnaeus described it has the fewer leaves, and that they spread on the ground with markedly waved edges. In *C. agrippinum* the leaves stand nearly upright and their margins are only slightly waved.

C. variegatum is found in Greece and the islands of the Archipelago, but though it has frequently been brought to our gardens ever since Parkinson's day, it is not often seen in them. It has grown and flowered well at Earlham Hall, near Norwich, for the last ten years, but is an uncertain plant here, generally attempting to flower in mid-December and being frustrated by some adverse spell of weather. The flowers are raised so little above the soil that they fall an easy prey to slugs.

In spite of these drawbacks, as Parkinson wrote "yet when it flowereth anything earlie that it may have any comfort of a warm sun, it is the glorie of all these kindes."

C. agrippinum as Baker states in his paper in the Linnaean Society's Journal, is a name found only in English gardens for a plant also known as *C. tessellatum*. Like *C. variegatum* it has chequered flowers and purple anthers but differs in the less pronounced, almost smudgy effect of the tessellation, and in the shape of its perianth segments, which widen suddenly near the base and taper with a rounded outline to rather blunt points. The "Botanical Magazine,"

t. 1028, represents this plant well in all characters except the anthers which are shown as yellow. This may have resulted from the drawing having been made from a mature flower after the pollen had covered the purple skin of the anther.

The flowers of *C. agrippinum* appear early, frequently in the end of August, rise on long perianth tubes and are numerous from each corm, in strong contrast with the dwarf, late and few flowers of *C. variegatum*. There is a conspicuous orange spot at the base of each filament. The leaves are longer and less waved at the edges and stand nearly erect. I have never noticed any seed vessels and this suggests a hybrid origin and makes one wonder whether *C. variegatum* could have been crossed with *C. autumnale* and have produced this easily grown and showy garden plant, the native country of which is unknown.

The name is derived from *agrippum*, the wild olive, but where the resemblance is found between two such different plants I cannot say.

C. Bivonae of Gussone I have not seen. Baker connects it with the beautiful figure in Redouté's "Liliacées," t. 238, which greatly resembles *C. agrippinum* and though the anthers are coloured yellow they are described as reddish, becoming black after the emission of the pollen. It is said to be found in Greece, Crete, Sicily and Naples. Willkomm includes it in his "Flora of Spain" as occurring in Portugal and synonymous with *C. lusitanicum* of Brotero.

C. Tenorii of Parlatore is an Italian species found near Naples. I believe I have the plant here as

described by Baker from specimens in the late H. J. Elwes' garden in Gloucestershire. As I know it it stands half-way between a tessellated form such as *C. agrippinum* and the rosy purple concolorous forms of *C. autumnale*, being slightly tessellated and in shape like *C. autumnale*. It flowers in September and is free flowering and easily grown.

C. amabile of Heldreich is not in cultivation. Halacsy conjectures that it includes *C. pulchrum* of Herbert. His description of beautifully tessellated rosy flowers, with yellow anthers, makes one hope that someone will shortly collect living roots from its home on the summit of Mount Dirphys in Euboea.

XVIII.

SPECIES PRODUCING LEAVES WITH THE FLOWERS.

MOST of the members of this group are difficult to cultivate. They are found in eastern Europe, Syria, Asia Minor, North Africa and one, *C. luteum*, in Afghanistan. They are too small and delicate for ordinary gardens, but those who like to struggle with a difficult plant and can give up a sufficiently good piece of sheltered ground to them should try *CC. hydrophilum*, *libanoticum* and *luteum* if they can obtain them.

C. Bertolonii of Steven is also known as *C. Cupani* Guss. It flowers from September to November and is widely distributed. It occurs in the Maritime Alps, Italy, Dalmatia, Montenegro, Greece and Algiers, yet I do not know of it in cultivation.

The leaves are narrow, two, or at most, three and appear with the small rosy lilac flowers, with brownish anthers.

C. Stevenii of Kunth is perhaps the Syrian form of the last. There is a good figure of it in the "Botanical Magazine," t. 8025, drawn from corms purchased by Kew from Mr. G. Egger of Jaffa, in 1904. Its yellow anthers distinguish it from *C. Bertolonii*.

C. fasciculare of Linnaeus, flowers from December to February in Palestine with small, starry, white flowers and is not in cultivation.



COLCHICUM MONTANUM.

 $\frac{3}{4}$ natural size.

C. Ritchii is even smaller than the last. The minute flowers appear in January but are very fugacious, and much sought after by slugs at that early date even in a moraine bed of granite chips where I have grown it for several seasons. The flowers are nearly white, very slightly tinted with pink. It is found in northern Syria.

C. brachyphyllum of Boissier, also from Syria, flowers in winter with small pink or white blossoms.

C. montanum of Linnaeus occurs from Portugal to the Caucasus and in Persia, Kurdistan and North Africa. It varies so much that it has been described under about a dozen synonyms and has been confused with several other species. Its rather globular flowers, with black anthers, produced in spring with the rather long, narrow and pointed leaves, distinguish it from its most nearly related species, *C. hydrophilum* and *C. libanoticum*. The leaves vary, with brown, horny margins or a fringe of fine hairs. I have had it from various sources, and in large numbers from Roumania, but have never succeeded in keeping it for more than a year or two. Mr. Dykes collected a robust form of it in Croatia a few years ago, that promises to have a better constitution than that shown by earlier importations. It has increased under his care, and corms he gave me flowered freely in January and February this year in the open ground. They are shown in Plate XXIV, about two-thirds of their natural size.

C. libanoticum of Ehrenburg was collected near snowdrifts at Sunnin on Mount Lebanon. It is well figured in t. 8015 in the "Botanical Magazine" for

1905, showing both the pale pink and white forms. It is said to differ from *C. montanum* in having yellow anthers and wider leaves. Plants sent to me as the Lebanon plant have dark purplish anthers before the pollen is discharged.

It is a robust form producing numerous flowers in January and February in the open. They are at first rather dwarf but rise up on the lengthening tubes after a day or so of mild weather and open widely in sunshine, and are then starry and about two inches across.

C. hydrophilum was described by its discoverer, Mr. Siehe, in the "Gardeners' Chronicle" for 1901.

It grows at an altitude of from 3,000 to 6,000 feet in the Taurus Mountains and rejoices in the abundant moisture from the melting snows at its flowering time. This has suggested its name which signifies "water-lover." It is stated to differ from *C. libanoticum* in its darker pink, and more sharply pointed, perianth segments. So far as I can see from plants which I have grown under the name, it is variable in shade of colour and the lighter forms are indistinguishable from the Lebanon plant.

It is figured in the "Botanical Magazine" for 1905 in t. 8040.

C. crociflorum of Regel was imported from Kokan by Mr. C. G. Van Tubergen of Haarlem in 1904, but I fear has disappeared from cultivation. Perhaps it is more curious than beautiful, but it is so distinct from other Colchicums that it always arrested attention. For several seasons the plant thrived on a sunny

bank of my rock garden, but eventually fell a victim to the depredations of slugs. The flowers appear in January, and are slender, with pointed segments, white internally, marked outside with a purple or rosy lilac stripe up the centre of each segment. The styles are greenish and the anthers yellow. The leaves only just appear above ground at flowering time.

Forms of *C. montanum* and *C. autumnale* have been described as both *crociflorum* and *crocifolium*, and Mr. Farrer was misled thereby to describe it incorrectly in the "English Rock Garden."

There is a good figure of the true plant in t. 8055 of the "Botanical Magazine" for 1906.

C. Szovitzii of Meyer from Armenia and Kurdistan I have never seen. It is said to be a larger form than *C. montanum* with yellow anthers and should be a good plant.

C. luteum was described by Baker in the "Gardeners' Chronicle" for 1874 and is figured in t. 6153 of the "Botanical Magazine."

It is found in Afghanistan and Beloochistan and is the only *Colchicum* known that has yellow flowers. It is unfortunately a very scarce plant in cultivation, but does well in Mrs. Ransome's garden at Ipswich, producing its small but rich yellow flowers in February. Here it suffered the same fate as *C. crociflorum*, the dwarf flowers and young leaves being devoured by slugs as soon as they appeared near the surface.

XIX.

BULBOCODIUM VERNUM AND MERENDERA BULBOCODIUM.

Two closely related genera have been frequently confused with that of *Colchicum*, and should be noticed here though very few of their species are in cultivation.

They differ from *Colchicums* in that the segments of the flowers are divided right down to the top of the ovary instead of being joined to form a perianth tube. When first the flowers appear above ground they sit so low that the absence of a tube is not noticeable. In their final stage they rise up high enough to split asunder. It can then be clearly seen that the six segments have until then, been held together only by the presence of the surrounding soil or the tips of their leaves. The first genus is *Bulbocodium*, from *bulbos*, a round root, and *kodion*, wool.

Bulbocodium vernum of Linnaeus is the only species of this genus in cultivation. It is a common plant in high mountains in central Europe and the Caucasus, flowering soon after the melting of the snow. Its small flowers are much like those of a *Colchicum* but rather redder in their tone of purple. They appear with the three pointed leaves which at flowering time are shaded with purple.

The base of each segment is furnished with a pair of sharply pointed teeth that point downwards. In the young stage of a flower these interlock and hold the segments so closely together that it appears to possess a tube. In older flowers they no longer function thus and the segments fall asunder in a singularly untidy fashion. Its three styles are welded together into one up to the base of the stigmata.

Bulbocodium vernum has been a favourite plant in English gardens for over three hundred years, but unless specially cared for and frequently replanted in good, well-drained soil, does not increase. It is worth growing as it flowers with us about the same time as the Snowdrop.

The genus *Merendera* differs from the last in having the three styles free to their bases as in the *Colchicum*, and not united as in *Bulbocodium*, also the greater number of its species flower in autumn.

The best of them is *Merendera Bulbocodium* of Ramond. It has also been called *Colchicum montanum* of Linnaeus and Clusius, and *Bulbocodium autumnale*. It is common in mountain pastures in Spain and Portugal and on the French side of the Pyrenees.

The corm is small about a quarter-of-an-inch in diameter, covered with a tough, brown tunic and with a short foot at the base like that of a *Colchicum*. The flowers appear with the autumn rains at intervals from August to October without leaves. The segments are long and narrow and form a prettily shaped, starry flower, of a very pleasing shade of rosy lilac. There

is a very scarce, but very beautiful, white form which has been collected for me in the Asturias Mountains. A form sent to me from Portugal flowers each season early in July and is thus the first of all the autumn-flowering bulbous plants to flower, appearing before *Colchicum alpinum* and *Leucoium (Acis) autumnale*.

The narrow leaves appear in October and remain green, until the capsules rise up in June. It grows and flowers well in beds principally formed of granite chips in sunny positions in the rock garden, and is a charming plant for such a position.

Another species, or a variety of this, found in the Balearic Isles and Algeria, is not in cultivation but would certainly be worth growing, having very narrow filiform leaves and is known as *M. filifolia*.

M. sobolifera of Meyer is the same plant as *Bulbocodium hastulatum* of Frivaldsky. It is more curious than beautiful, having minute flowers with narrow, almost threadlike segments, which soon split asunder. It flowers in early spring and is chiefly remarkable for its curious corm formed annually at the end of an underground stolon.

INDEX.

BULBOCODIUM VERNUM 180.

COLCHICUM, Botanical characters of 154-7.

- " poisonous 157.
- " remedy for gout 158.
- " agrippinum 173.
- " algeriense 163.
- " alpinum 164.
- " amabile 175.
- " autumnale 161.
- " " album 161.
- " " " plenum 162.
- " " atropurpureum 161.
- " " flora pleno 162.
- " " minor 162.
- " " striatum 161.
- " Balansae 162.
- " Bertolonii 176.
- " Bivonae 174.
- " Bornmulleri 169.
- " brachyphyllum 177.
- " byzantinum 165.
- " candidum 163.
- " cilicicum 166.
- " corsicum 165.
- " crociflorum 178.
- " Cupani 176.
- " Decaisnei 163.
- " euboeum 172.
- " fasciculare 176.
- " guadarriamense 164.
- " hydrophilum 178.
- " illyricum 170.
- " laetum 163.
- " libanoticum 177.
- " lingulatum 163.
- " lusitanicum 174.
- " luteum 179.
- " maximum 169.
- " montanum 177.
- " neapolitanum 165.
- " parnassicum 162.
- " pulchrum 175.
- " Ritchii 177.
- " Sibthorpii 171.
- " speciosus 167.
- " " album 168.
- " " Bornmulleri 169.
- " " giganteum 169.
- " " illyricum 170.
- " " maximum 169.
- " " rubrum 168.
- " Steveni 176.
- " Szovitzii 179.

COLCHICUM, Tenorii 174.

- " Troodi 163.
- " variegatum 172.
- " veratrifolium 166.
- Crociris iridiflora** 43.
- Crocologia** of Hertodt 61-2.
- Crocus Adami**, var. of biflorus 124.
- " aerius 132.
- " Aitchisonii, var. of speciosus 45.
- " alataricus 141.
- " albanus 67.
- " albiflorus, var. of vernus 74.
- " albiflos, var. of Imperati 84.
- " aleppicus 58.
- " Alexandri, var. of biflorus 123.
- " algeriensis 139.
- " ancyrensis 100-1.
- " argenteus, var. of biflorus 121.
- " asturicus 30.
- " atlanticus 139.
- " aureus 103.
- " " varieties of 105-9.
- " Autranii 41.
- " Balansae 113.
- " banaticus 77.
- " Barrii, var. of biflorus 126.
- " biflorus 119.
- " " varieties of 120-6.
- " Biliottii 145.
- " Blue Rock, var. of chrysanthus 132.
- " Boissieri 145.
- " Boryi 54.
- " Bullfinch, var. of chrysanthus 131.
- " Bumble-bee, var. of chrysanthus 129.
- " byzantinus 42.
- " Cambessedesii 89.
- " campestris 69.
- " cancellatus 36.
- " candidus 114.
- " carpetanus 138.
- " Cartwrightianus 65, 63.
- " caspius 53.
- " Celeste, var. of biflorus 126.
- " chrysanthus 127.
- " " varieties of 129.
- " chrysobelonicus 69.
- " Cloth of Silver 92.
- " Clusii 31.
- " corsicus 88.
- " Crewei 135.

Crocus cyprius 133.

- " *dalmaticus* 89.
- " *Danfordiae* 137.
- " *dispathaceus* 68.
- " *Dutch Yellow* 106.
- " *Elwesii* 67.
- " *etruscus* 87.
- " *Fleischeri* 140.
- " *Foxii*, var. of *hyemalis* 57.
- " *Gaillardotii* 58.
- " *gargaricus* 98.
- " *globosus*, var. of *speciosus* 45.
- " *G. Maw*, var. of *vernus* 74.
- " *Golden Pheasant*, var. of *chrysanthus* 129.
- " *Golden Plover*, var. of *chrysanthus* 129.
- " *hadriaticus* 69.
- " *Hartmannianus* 134.
- " *Hausknechtii* 66.
- " *hermoneus* 46.
- " *Heuffelianus* 77.
- " *hyemalis* 57.
- " " var. *Foxii* 57.
- " *Imperati* 83-6.
- " " var. *albiflorus* 84.
- " " var. *monophyllus* 85, 82.
- " " var. *Sardoae* 86.
- " *insularis* 82, 88.
- " *intromissus* 58.
- " *iridiflorus* 42.
- " " var. *President* 43.
- " " var. *Rosamond* 43.
- " " var. *Ruby* 43.
- " *isauricus* 126.
- " *Jessoppiae* 146.
- " *John Hoog*, var. of *chrysanthus* 130
- " *karduchorum* 40.
- " *Kathleen Parlow*, var. of *vernus* 74.
- " *Korolkowii* 109-111.
- " " var. *Dytiscus* 111.
- " *lacteus*, var. of *aureus* 105.
- " *laevigatus*, 55-7.
- " " var. *Fontenayi* 56.
- " *lagenaeiflorus* 104.
- " *Landerianus* 115.
- " *Lapland Bunting*, var. of *chrysanthus* 130.
- " *lazicus* 144.
- " *Lemon Queen*, var. of *biflorus* 124.
- " *leucorhynchus*, var. of *vernus* 74.
- " *leucostigma*, var. of *vernus* 74.
- " *longiflorus* 49.
- " " var. *melitensis* 50.
- " " var. *venustus* 50.
- " " var. *Wilhelmii* 50.
- " *lutescens*, var. of *aureus* 106.
- " *luteus* 106.

Crocus *Madame Mina*, var. of *vernus* 73.

- " *Malyi* 78.
- " *Margot*, var. of *vernus* 74.
- " *Maximilian*, var. of *vernus* 74.
- " *medius* 38.
- " *melanthorus* 144.
- " *minimus* 87.
- " *moabiticus* 47.
- " *montanus*, var. of *Imperati* 84.
- " *Montblanc*, var. of *vernus* 74.
- " *montenegrinus* 145.
- " *Moonlight*, var. of *chrysanthus* 130.
- " *Morleon* 92.
- " *Mountainii*, var. of *candidus* 115.
- " *Mouradi* 146.
- " *nevadensis* 139.
- " *nubigena*, var. of *biflorus* 122.
- " *nucerensis*, var. of *Imperati* 84.
- " *nudiflorus* 27-9.
- " *ochroleucus* 54.
- " " var. of *alataricus* 142.
- " *olbanus* 67.
- " *Olivieri* 112.
- " *Orphanidis* 51.
- " *Orsinii* 62, 65.
- " *Pallasii* 68-9.
- " *pallidus*, var. of *chrysanthus* 129.
- " *Parkinsonii*, var. of *biflorus* 120.
- " *parviflorus* 141.
- " *peloponnesiacus* 70.
- " *Pesalozzae* 134.
- " *picturatus*, var. of *versicolor* 92.
- " *pictus*, var. of *Tomasinianus* 76.
- " *pulchellus* 46.
- " *purpureus grandiflorus*, var. of *vernus* 73.
- " *pusillus*, var. of *biflorus* 122.
- " *reticulatus* 97.
- " *Saffron C.* 59.
- " *Salzmännii* 30.
- " " var. *erectophyllus* 31.
- " *Sardoae*, var. of *Imperati* 85.
- " *sativus* 59-69.
- " *Saundersianus* 69.
- " *Scharojanii* 34.
- " *Scotch C.* 120.
- " *Serotinus* 32.
- " *siculus* var. of *vernus* 74.
- " *Sieberi* 93.
- " " varieties of 94-6.
- " *Silver Pheasant*, var. of *chrysanthus* 130.
- " *Siskin*, var. of *chrysanthus* 131.
- " *Snow Bunting*, var. of *chrysanthus* 129, 130.
- " *speciosus* 44.
- " " varieties of 45.
- " *stellaris* 100.
- " *suaveolens* 86.
- " *sub-apenninus* 82.
- " *subflavus*, var. of *candidus* 114.

- Crocus sulphureus, var. of aureus 108-9.
- „ susianus 98.
- „ Suterianus 111.
- „ Tauri 97, 136.
- „ „ melananthorus 144.
- „ Tenoreanus 122.
- „ Thomasii, var. of sativus 66.
- „ Tomasinianus 75.
- „ Tournefortii 50.
- „ vallicola 35.
- „ „ var. suworovianus 36.
- „ veluchensis 96.
- „ Veneris 58.
- „ vernus 72.
- „ „ botanical varieties of 74.
- „ „ garden varieties of 73-4.
- „ versicolor 90.
- „ visianicus 69.
- „ vitellinus 115.
- „ Warley Variety, var. of chrysan-
thus 131.
- „ Weldenii, var. of biflorus 123.
- „ Yellow Dutch 106.
- Crocus Yellow Hammer, var. of chrysan-
thus 129.
- „ Zohrabii 36.
- „ zonatus 39.
- Crocuses, cultivation of 3.
- „ enemies of 7-8.
- „ Fertilization of 9.
- „ frame for 5, 6.
- Glossary ix.
- Grass, Colchicums suitable for 159.
- „ Crocuses suitable for 7.
- Hursinein 37.
- Hybrids of Crocuses 118, 133, 146.
- Insect visitors 22, 23.
- Karkom 59.
- Merendera Bulbocodium 181.
- „ filifolia 182.
- „ sobolifera 182.
- Mice 8.
- Romulea 25.
- Saffron 59-62.
- Seed, collecting 10.
- Seedlings, raising 9, 10.

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